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WAR DEPARTMENT.

193

MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

JANUARY, 1885.

PREPARED UNDER THE DIRECTION OF
BRIG. & BVT. MAJ. GEN'L W. B. HAZEN,
CHIEF SIGNAL OFFICER OF THE ARMY,

BY JAMES ALLEN,
1st LIEUTENANT, 3^d CAVALRY, U. S. A., A. S. O. AND ASSISTANT.

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1885.

List of merchant marine steam and sailing vessels from which International Simultaneous Meteorological reports were received at the Office of the Chief Signal Officer, U. S. Army, Washington, D. C., in time to be used in the preparation of the Weather Review for the month of January, 1885.

Name of vessel.	Observers.	Name of vessel.	Observers.	Name of vessel.	Observers.
<i>Allan Line.</i>		<i>National Line.</i>		<i>Miscellaneous.</i>	
Br. s. s. <i>Circassian</i>	Capt. R. H. Hughes, C. E. Le Gallais, Alex. McDougall, John Park, R. P. Moore.	Br. s. s. <i>Canada</i>	Capt. Wm. Pearce, Wm. Pearce, Geo. Cochrane, Jas. Sumner.	Br. s. s. <i>Biela</i>	Capt. Fred. Graham, W. H. Thomas, Thos. Liddle, M. Garrison, U. N. Mumford, Geo. Dunham, Wm. Clayton, Geo. Dulling.
<i>American Line.</i>		<i>New York and Cuba Mail S. S. Co.</i>		<i>East Anglia</i>	
Br. s. s. <i>British Crown</i>	Geo. C. Burton, E. H. Fresh, Geo. H. Dodge, P. Urquhart.	Am. s. s. <i>Cienfuegos</i>	F. M. Faircloth.	<i>Kairros</i>	
Am. <i>Illinois</i>		<i>N. Y., Havana & Mexican Mail S. S. Co.</i>		<i>Madrid</i>	
Br. <i>Lord Clive</i>		Am. s. s. <i>City of Alexandria</i>	J. W. Reynolds.	<i>North Anglia</i>	
<i>Anchor Line.</i>		<i>North German Lloyd Steamship Co.</i>		<i>Ocean King</i>	
Br. s. s. <i>Anchoria</i>	J. J. Small, John Wilson, L. Garrick, Geo. Mitchell.	Ger. s. s. <i>America</i>	G. Meyer, W. Willigeroed, F. Hapielmann, Ch. Loist.	<i>Picuna</i>	
<i>Ethiopia</i>			O. Heimbruch, H. Christoffers, Fr. Pfeiffer, H. Baur.	<i>Port Phillip</i>	
<i>Furnessia</i>			C. Thaalenhorst, H. Hellmers, R. Bnsius, A. Jaeger, C. Wiegand, H. Heincke, H. Bruns.	<i>New York Herald Weather Service.</i>	
<i>Trinacria</i>				Am. s. s. <i>Acapulco</i>	W. G. Shackford, J. W. Sansom.
<i>Atlas Line.</i>				Br. <i>Albano</i>	H. B. Hughes, J. B. Percy, E. J. Siders, D. Williams, Sam. Brooks, W. H. P. Hains, W. A. Beynon, Thomas Roberts, H. Perry, W. M. Hopkins, W. C. Boynes, Benj. Gleedale, R. B. Quick, Francis S. Land, Henry Condon, Fred. Watkiss, A. Redford, John Desken, Arthur Lewis, S. G. Porter, Ob. Leist, M. Murphy, F. N. Schieberck, P. Stierendregt, B. Voss, A. J. Griffin, J. Douglas, H. Weyer, Wm. Duncombe, T. H. Bonjer, J. C. Jamison, P. J. Irving, J. de Harnecourt, P. Whesian, DeJousselin, A. G. Braes, John McIntosh, Thos. Cook, H. Buschmann, Geo. Cochrane, Julius Uberweg.
Br. s. s. <i>Alja</i>	Jno. W. Sansom, David Williams, R. de Echevarrieta, Horatio Low.	Am. s. s. <i>Boston & Halifax Line</i>	G. H. Brown.	Am. s. s. <i>Alisa</i>	Com. W. G. Randle, Capt. G. Baker, E. W. Chevalier.
<i>Alvo</i>				Am. s. s. <i>Algiers</i>	
Span. <i>Andes</i>				Am. s. s. <i>Aleme</i>	
<i>Athos</i>				Am. s. s. <i>Alvo</i>	
<i>Bridal-City Line.</i>				Am. s. s. <i>Arizona</i>	
Br. s. s. <i>Lundaff City</i>				Belg. s. s. <i>Aurania</i>	
<i>California and Mexican S. S. Co.</i>				Br. s. s. <i>Belgenland</i>	
Am. s. s. <i>Newbern</i>				Am. s. s. <i>Bothnia</i>	
<i>Canada Shipping Company.</i>				Am. s. s. <i>Britannic</i>	
Br. s. s. <i>Lake Huron</i>	Wm. Benson, Wm. Stewart, H. Campbell.			Am. s. s. <i>Caracas</i>	
<i>Lake Manitoba</i>				Am. s. s. <i>Carn. Marth</i>	
<i>Lake Neponig</i>				Am. s. s. <i>Celtic</i>	
<i>Cunard-Line.</i>				Am. s. s. <i>Chalmotte</i>	
Br. s. s. <i>Bothnia</i>	T. Roberts, Alex. McKay, Cephalaria, Gallia, Soythia.			Br. s. s. <i>City of Berlin</i>	
<i>Catalonia</i>				Am. s. s. <i>City of Chester</i>	
<i>Cephalaria</i>				Am. s. s. <i>City of Chicago</i>	
<i>Gallia</i>				Am. s. s. <i>City of Montreal</i>	
<i>Soythia</i>				Am. s. s. <i>City of Pueblo</i>	
<i>Edward Carr's S. S. Line.</i>				Am. s. s. <i>City of Richmond</i>	
Ger. s. s. <i>California</i>				Am. s. s. <i>Colon</i>	
<i>Furness Line.</i>				Am. s. s. <i>Colom</i>	
Br. s. s. <i>Durham City</i>				Am. s. s. <i>Emilia</i>	
<i>General Trans-Atlantic Steamship Co.</i>				Am. s. s. <i>Ense</i>	
Fr. s. s. <i>Canada</i>	G. S. de Kersabie, M. de Joussetin.			Am. s. s. <i>Gallia</i>	
<i>St. Laurent</i>				Am. s. s. <i>Gele</i>	
<i>Guion Line.</i>				Am. s. s. <i>Leerdam</i>	
Br. s. s. <i>Alaska</i>	Geo. S. Murray, Sam. Brooks, C. L. Rigby.			Am. s. s. <i>Lessing</i>	
<i>Arizona</i>				Am. s. s. <i>Nederland</i>	
<i>Wyoming</i>				Am. s. s. <i>Nevada</i>	
<i>Hamburg-American Line.</i>				Am. s. s. <i>Pennland</i>	
Ger. s. s. <i>Bohemia</i>	R. Karlowa, W. Kuhleinwein, B. Voss, O. Pezoldt, H. Vogelgesang, A. Albers, C. Heibich.			Am. s. s. <i>Persian Monarch</i>	
<i>Gellert</i>				Am. s. s. <i>P. Caland</i>	
<i>Lessing</i>				Am. s. s. <i>Rhynland</i>	
<i>Moravia</i>				Am. s. s. <i>Republic</i>	
<i>Rhætia</i>				Am. s. s. <i>Schiedam</i>	
<i>Rhina</i>				Am. s. s. <i>Scythia</i>	
<i>Wieland</i>				Am. s. s. <i>St. Laurent</i>	
<i>Isman Line.</i>				Am. s. s. <i>State of Nebraska</i>	
Br. s. s. <i>City of Montreal</i>	Arthur Redford, A. W. Lewis.			Am. s. s. <i>State of Nebrask</i>	
<i>City of Richmond</i>				Am. s. s. <i>State of Nevada</i>	
<i>Lampert & Holt's Steamship Company.</i>				Am. s. s. <i>State Line</i>	
Br. s. s. <i>Hevelius</i>	John Carroll.			Am. s. s. <i>State of Georgia</i>	
<i>Leyleand Line.</i>				Am. s. s. <i>State of Nebraska</i>	
Br. s. s. <i>Bulgarian</i>	E. Parry, W. H. Trant, M. Pitt.			Am. s. s. <i>State of Nevada</i>	
<i>Venetian</i>				Am. s. s. <i>State Line</i>	
<i>Virginian</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Liverpool, Brazil and River Plate Steam Navigation Company.</i>				Am. s. s. <i>State of Orgegia</i>	
Br. s. s. <i>Olbers</i>	James Clarke.			Am. s. s. <i>State of Orgegia</i>	
<i>Mallory Line.</i>				Am. s. s. <i>State of Orgegia</i>	
Am. s. s. <i>Alampas</i>	M. B. Crowell, A. C. Burrows.			Am. s. s. <i>State of Orgegia</i>	
<i>San Marcus</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Mediterranea and New York S. S. Co.</i>	Domenico Viola.			Am. s. s. <i>State of Orgegia</i>	
It. s. s. <i>Archimede</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Miss. & Dominion S. S. Co.</i>	Geo. S. Dale, W. P. Couch, H. C. Williams, Jas. McAuley.			Am. s. s. <i>State of Orgegia</i>	
Br. s. s. <i>Brooklyn</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Ontario</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Oregon</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Toronto</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Monarch Line.</i>				Am. s. s. <i>State of Orgegia</i>	
Br. s. s. <i>Assyrian Monarch</i>	John Harrison.			Am. s. s. <i>State of Orgegia</i>	
<i>Morgan's La & Texas R. R. & S. S. Co.</i>				Am. s. s. <i>State of Orgegia</i>	
Am. s. s. <i>Chalmette</i>	Roht. B. Quick.			Am. s. s. <i>State of Orgegia</i>	
<i>National Line.</i>				Am. s. s. <i>State of Orgegia</i>	
Br. s. s. <i>Canada</i>	Capt. R. H. Hughes, C. E. Le Gallais, Alex. McDougall, John Park, R. P. Moore.			Am. s. s. <i>State of Orgegia</i>	
<i>France</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Holland</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Spain</i>				Am. s. s. <i>State of Orgegia</i>	
<i>New York and Cuba Mail S. S. Co.</i>				Am. s. s. <i>State of Orgegia</i>	
Am. s. s. <i>Cienfuegos</i>				Am. s. s. <i>State of Orgegia</i>	
<i>North German Lloyd Steamship Co.</i>				Am. s. s. <i>State of Orgegia</i>	
Ger. s. s. <i>America</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Eider</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Elbe</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Ems</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Fulda</i>				Am. s. s. <i>State of Orgegia</i>	
<i>General Werder</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Habsburg</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Hermann</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Leipzig</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Main</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Neckar</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Nürnberg</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Saale</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Strasbourg</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Weser</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Ocean Steamship Company.</i>				Am. s. s. <i>State of Orgegia</i>	
Am. s. s. <i>City of Augusta</i>	T. L. Weiss.			Am. s. s. <i>State of Orgegia</i>	
<i>Occidental & Oriental S. S. Company.</i>				Am. s. s. <i>State of Orgegia</i>	
Br. s. s. <i>Arabie</i>	E. T. Rogers.			Am. s. s. <i>State of Orgegia</i>	
<i>Oceanic</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Oceanic Steamship Company.</i>				Am. s. s. <i>State of Orgegia</i>	
Am. s. s. <i>Alameda</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Mariposa</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Old Regular Line for Buenos Ayres.</i>				Am. s. s. <i>State of Orgegia</i>	
Am. s. s. <i>Mendoza</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Oregon Railway and Navigation Co.</i>				Am. s. s. <i>State of Orgegia</i>	
Am. s. s. <i>City of Chester</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Columbia</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Oregon</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Pacific Coast Steamship Company.</i>				Am. s. s. <i>State of Orgegia</i>	
Am. s. s. <i>Ancon</i>	O. Winckler.			Am. s. s. <i>State of Orgegia</i>	
<i>Mexico</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Orizaba</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Santa Rosa</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Pacific Mail Steamship Company.</i>				Am. s. s. <i>State of Orgegia</i>	
Br. s. s. <i>Australia</i>				Am. s. s. <i>State of Orgegia</i>	
<i>City of Peking</i>				Am. s. s. <i>State of Orgegia</i>	
<i>City of Rio Janeiro</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Colima</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Quebec Steamship Company.</i>				Am. s. s. <i>State of Orgegia</i>	
Br. s. s. <i>Australia</i>				Am. s. s. <i>State of Orgegia</i>	
<i>City of Peking</i>				Am. s. s. <i>State of Orgegia</i>	
<i>City of Rio Janeiro</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Colima</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Quebec Steamship Company.</i>				Am. s. s. <i>State of Orgegia</i>	
Br. s. s. <i>Orinoco</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Red "D" Line.</i>				Am. s. s. <i>State of Orgegia</i>	
Am. s. s. <i>Caracas</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Red Star Line.</i>				Am. s. s. <i>State of Orgegia</i>	
Belg. s. s. <i>Belgenland</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Nederland</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Rhynland</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Switzerland</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Waesland</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Rotterdam Line.</i>				Am. s. s. <i>State of Orgegia</i>	
Dtch. s. s. <i>Edam</i>				Am. s. s. <i>State of Orgegia</i>	
<i>P. Caland</i>				Am. s. s. <i>State of Orgegia</i>	
<i>W. A. Scholten</i>				Am. s. s. <i>State of Orgegia</i>	
<i>State Line.</i>				Am. s. s. <i>State of Orgegia</i>	
Br. s. s. <i>State of Georgia</i>				Am. s. s. <i>State of Orgegia</i>	
<i>State of Nebraska</i>				Am. s. s. <i>State of Orgegia</i>	
<i>State of Nevada</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Thingwalla Line.</i>				Am. s. s. <i>State of Orgegia</i>	
Dan. s. s. <i>Geiser</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Thingwalla</i>				Am. s. s. <i>State of Orgegia</i>	
<i>U. S. and Brazil Mail S. S. Co.</i>				Am. s. s. <i>State of Orgegia</i>	
Am. s. s. <i>Finance</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Warren Line.</i>				Am. s. s. <i>State of Orgegia</i>	
Br. s. s. <i>Iowa</i>				Am. s. s. <i>State of Orgegia</i>	
<i>White Star Line.</i>				Am. s. s. <i>State of Orgegia</i>	
Br. s. s. <i>Adriatic</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Britannie</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Republic</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Wilson Line.</i>				Am. s. s. <i>State of Orgegia</i>	
Br. s. s. <i>Galileo</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Lepanto</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Marengo</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Richard Potter.</i>				Am. s. s. <i>State of Orgegia</i>	
Lieut. Rogers, R. N. R.				Am. s. s. <i>State of Orgegia</i>	
Capt. J. H. Mait.				Am. s. s. <i>State of Orgegia</i>	
<i>Samuel Walters.</i>				Am. s. s. <i>State of Orgegia</i>	
				Am. s. s. <i>State of Orgegia</i>	
<i>White Star Line.</i>				Am. s. s. <i>State of Orgegia</i>	
Br. s. s. <i>Adriatic</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Britannie</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Republic</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Wilson Line.</i>				Am. s. s. <i>State of Orgegia</i>	
Br. s. s. <i>Galileo</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Lepanto</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Marengo</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Richard Potter.</i>				Am. s. s. <i>State of Orgegia</i>	
Lieut. Rogers, R. N. R.				Am. s. s. <i>State of Orgegia</i>	
Capt. J. H. Mait.				Am. s. s. <i>State of Orgegia</i>	
<i>Samuel Walters.</i>				Am. s. s. <i>State of Orgegia</i>	
				Am. s. s. <i>State of Orgegia</i>	
<i>White Star Line.</i>				Am. s. s. <i>State of Orgegia</i>	
Br. s. s. <i>Adriatic</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Britannie</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Republic</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Wilson Line.</i>				Am. s. s. <i>State of Orgegia</i>	
Br. s. s. <i>Galileo</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Lepanto</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Marengo</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Richard Potter.</i>				Am. s. s. <i>State of Orgegia</i>	
Lieut. Rogers, R. N. R.				Am. s. s. <i>State of Orgegia</i>	
Capt. J. H. Mait.				Am. s. s. <i>State of Orgegia</i>	
<i>Samuel Walters.</i>				Am. s. s. <i>State of Orgegia</i>	
				Am. s. s. <i>State of Orgegia</i>	
<i>White Star Line.</i>				Am. s. s. <i>State of Orgegia</i>	
Br. s. s. <i>Adriatic</i>				Am. s. s. <i>State of Orgegia</i>	
<i>Britannie</i>					

MONTHLY WEATHER REVIEW.

VOL. XIII.

WASHINGTON CITY, JANUARY, 1885.

No. 1.

INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States and Canada during January, 1885, based upon the reports from the regular and voluntary observers of the Signal Service and from co-operating state weather services.

Descriptions of the storms which occurred over the north Atlantic ocean during the month are also given, and their approximate paths shown on chart i.

The paths of eleven atmospheric depressions are traced on chart i. and are described under "Areas of low barometer;" the average number of depressions for the month of January during the last eleven years is 13.4.

The mean pressure for the month differs but slightly from the normal in all parts of the country except in New England and portions of the lake region and middle Atlantic states, where it was from .05 to .10 inch below the normal.

The month was decidedly colder than the average January from the Ohio valley and lower lakes westward to the eastern portions of Montana, Wyoming, and Colorado, and also in Texas, Idaho, and the eastern portions of Oregon and Washington Territory; it was slightly warmer than the average along the coasts of the Atlantic and Pacific.

The precipitation was in excess of the average in the districts east of the Mississippi river and from Missouri and Kansas southward to the Rio Grande river; it was deficient in the extreme northwest, upper Missouri valley, Rocky mountain districts and on the Pacific coast.

The severest snow-storms of the month occurred in the western and southern districts during the passage of low areas v. and x.; in consequence of these storms travel of all kinds was seriously interrupted and heavy losses of live-stock were sustained.

Tornadoes occurred on the 11th in Alabama and Mississippi, and on the 12th in Georgia, causing loss of life and the destruction of much property.

In the preparation of this REVIEW the following data, received up to February 20th, 1885, have been used, viz.: the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and twenty-nine Signal Service stations and seventeen Canadian stations, as telegraphed to this office; one hundred and fifty-three monthly journals and one hundred and sixty-one monthly means from the former, and seventeen monthly means from the latter; two hundred and eighty-one monthly registers from voluntary observers; forty-five monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime

Register;" monthly reports from the New England Meteorological Society, and from the local weather services of Alabama, Georgia, Illinois, Indiana, Minnesota, Missouri, Nebraska, Ohio, and Tennessee, and of the Central Pacific Railway Company; trustworthy newspaper extracts; and special reports.

ATMOSPHERIC PRESSURE.

[Expressed in inches and hundredths.]

The distribution of mean atmospheric pressure for January, 1885, determined from the tri-daily telegraphic observations of the Signal Service, is shown by the isobarometric lines on chart ii.

The mean pressure for the month is greatest over the middle and northern plateau districts, where an area is inclosed by an isobar for 30.25; it is least over the Canadian Maritime Provinces, where the barometric means fall to 29.88 and 29.89 respectively, at Sidney, Nova Scotia, and Father Point, Quebec. The region inclosed by the isobar for 30.2 embraces the greater part of the United States and extends from the eastern portions of Washington Territory and Oregon southeastward to the Gulf and Atlantic coasts. Along the immediate coasts of Washington Territory and Oregon, and in southern California, the mean pressure decreases to 30.1. An isobar for 30.15 is traced from northern Minnesota to the Virginia coast; to the north and east of this line the barometric means decrease to 29.9 and below, as stated above.

The mean pressure, as compared with that for December, 1884, shows a decrease over the northern portions of the country from central Montana to the Atlantic coast, the deficiencies being greatest in New England and the Maritime Provinces, where they vary from .07 to .15. In all other districts the barometric means are higher than those for December. The increase ranges from .10 to .15 from the lower Mississippi river to the south Pacific coast; from .08 to .18, in northern plateau and north Pacific coast region, and from .20 to .25 in the middle plateau and middle Pacific coast.

The departures from the normal pressure are given in the table of miscellaneous meteorological data; they are also exhibited on chart iv. by lines connecting stations of equal departure. Along the northern boundary of the country from Idaho eastward to the Atlantic coast, and in the upper Ohio valley and middle Atlantic states, the mean pressure is below the normal, the departures being less than .05, except in northern Michigan and in New England, where they vary from .05 to .10; a deficiency of .02 is shown at Cedar Keys, Florida. In all other districts the pressure is above the normal, but the departures are nowhere marked, being less than .05 at all stations, except .07 at Brownsville, Texas, and .05 at Fort Concho, Texas, and Fort Apache, Arizona.

BAROMETRIC RANGES.

The monthly barometric ranges at Signal Service stations are given in the table of miscellaneous data; they were greatest from the upper Mississippi valley to the New England coast, where they varied from 1.40 to 1.74, the greatest being reported from Eastport, Maine; they were least in Florida, California, and in the middle and southern plateau regions, where they varied from .52 to .60, except at Key West, Florida, where the monthly range was .36.

AREAS OF HIGH BAROMETER.

I.—The description of this area is a continuation of number v. of December, 1884. The morning report of January 1st showed the barometer to be highest in Manitoba, with a decided increase in the pressure extending over the lake region and thence south to the Gulf. On the morning of the 2d the centre of high pressure was in the Mississippi valley, and during the following twenty-four hours moved to the middle Atlantic coast, and on the morning of the 5th passed over Nova Scotia. On the morning of the 1st the cold wave had extended east and south, causing a fall in temperature of 26° to 37° in the lower lake region, 20° to 40° in Tennessee and the Ohio valley, and 17° to 26° in the Gulf states. During the day it reached the Atlantic coast, causing a fall in temperature of 20° to 30° . The time that elapsed from its first appearance in Montana until it reached the different districts is as follows: Missouri valley, eight to sixteen hours; Mississippi valley, seventy-two hours, having been, as stated in the description given of number v. in the REVIEW of December, 1884, retarded by the development of a low in this district; upper lake region, seventy-two hours; lower lake region, and Tennessee and Ohio valley, eighty hours; Atlantic coast, one hundred and four hours.

II.—This area first appeared on the California coast on the 4th. On the 5th a decided rise occurred in the extreme northwest; on the 6th a decided rise in the upper Mississippi and Missouri valleys and thence south to the Gulf. During the 7th the increase in pressure extended northeast to the lake region, and on the 8th over Nova Scotia. The movement of the centre of high pressure was east and south of California until on the morning of the 8th; the barometer was highest in Florida. Owing to this southerly movement no very decided fall in temperature occurred, the greatest being from 10° to 16° in the middle Atlantic states on the 7th.

III.—This area first appeared in Oregon on the 8th; the centre moved southeasterly into Kansas on the 9th, and reached the Atlantic coast on the 10th. The greatest changes in pressure occurred along a line from Oregon to Manitoba, thence across the great lakes up the Saint Lawrence valley, the changes in twenty-four hours being from $.50$ to $.80$. The accompanying cold wave first appeared on the afternoon of the 8th in Montana, the temperature having fallen 17° to 20° in twenty-four hours. The number of hours from this date until it was first felt in the other districts is as follows: Missouri valley, sixteen hours; Mississippi valley and upper lake region, twenty-four hours; lower lake region and Tennessee and Ohio valley, thirty-two hours; New England, forty hours; middle and south Atlantic and Gulf states, forty-eight hours. The minimum temperature occurred in New England during the night of the 10th and in the other districts, east of the Mississippi river during the night of the 9th. The general effect was a fall of 7° to 10° in southern districts, and from 15° to 20° in northern districts.

IV.—This area was central north of Montana on the morning of the 11th, where it remained, increasing in pressure, during that day. It moved into the Missouri valley on the 12th, and passed off the Atlantic coast on the 14th. The morning report of the 11th showed a fall in temperature of 20° to 30° in Montana and the Northwest Territories, and from 8° to 13° in the northern half of the Missouri valley. The number of hours from this date until the cold wave reached the other districts, and the fall in temperature, were as follows: upper Mississippi valley, sixteen hours, fall in temperature, 27° to 50° , the minimum occurring on the morning of the 13th; upper lake region, twenty-four hours, fall in temperature, 30° to 40° , the minimum on the morning of the 13th; lower lake region, thirty-two hours, fall in temperature, 20° to 30° , the minimum on the morning of the 13th; Tennessee and Ohio valley, and Gulf states, twenty-four to thirty-two hours, with a fall of 10° to 15° in southern portions, and 20° to 30° in the Ohio valley, the minimum generally occurring on

the morning of the 13th; districts on the Atlantic coast, forty hours, with a fall in New England and the middle Atlantic states of 20° to 30° , and in the south Atlantic states of 10° to 18° , the minimum occurring on the morning of the 14th.

V.—This high area appeared in Montana on the 13th, where it remained highest during the 13th and 14th. The increase in pressure extended southward to the Gulf during the 15th and 16th, and thence northeastward to the Atlantic coast districts on the 17th and 18th. The cold wave appeared over the northern plateau on the afternoon of the 13th. On the 14th the temperature in the Missouri valley fell from 10° to 16° , the minimum occurring on the morning of the 17th, with a total fall in temperature of 10° to 15° . In the Mississippi valley and the west Gulf states the minimum occurred on the morning of the 17th, with a fall of 20° to 30° in forty-eight hours. The minimum occurred on the morning of the 17th over the west portion of the Ohio valley and Tennessee and the east Gulf states, and on the morning of the 18th over the eastern portion of these districts. The minimum occurred in the middle and south Atlantic states on the morning of the 18th, and in New England on the morning of the 20th. The fall in temperature was from 20° to 45° , the greatest fall being on the middle Atlantic coast.

VI.—The afternoon report of the 20th showed an area of high barometer central just north of Dakota. In Manitoba and northern Minnesota the barometer had risen from $.39$ to $.47$ inch, and the temperature had fallen from 17° to 21° . The centre of high pressure moved into the Mississippi valley on the 21st, and reached the Atlantic coast on the 22d; the increase in pressure ranged from $.40$ to $.70$. The minimum temperature occurred in the Missouri valley on the morning of the 21st and in the Mississippi valley and all districts to the east of it on the morning of the 22d. The fall in temperature during the passage of this area of high barometer was from 10° to 20° .

VII.—During the 23d the barometer rose from $.20$ to $.40$ inch over Montana and at stations in the Northwest Territories, the highest pressure being in the Saskatchewan valley. During the 24th the increased pressure extended eastward to the lakes and southward to the Gulf, and reached the Atlantic coast on the 26th, and continued in New England on the 27th. The cold wave accompanying the high barometer appeared in the Saskatchewan valley on the morning of the 23d, the temperature having fallen from 12° to 20° . By the morning of the 24th a further fall of 18° to 20° had occurred. Counting from this date (morning of the 24th) the number of hours that elapsed before it reached the different districts and total fall in temperature are as follows: Missouri valley, eight hours, fall in temperature, 20° to 30° ; Mississippi valley, sixteen hours, fall in temperature 20° to 30° , the minimum occurring on the morning of the 26th; lake region, twenty-four hours, fall in temperature, 20° to 30° , the minimum generally occurring on the morning of the 27th; Atlantic coast, forty-eight hours, fall in temperature, 15° to 25° , minimum on the morning of the 27th; Tennessee and Ohio valley and east Gulf states, forty hours, fall in temperature, 18° to 28° , the minimum occurred on the morning of the 26th.

VIII.—The morning report of the 27th showed an area of high barometer central in Dakota. During the day it moved into the Missouri valley, and, on the 28th, into the east Gulf states. On the 29th the barometer was highest on the south and middle Atlantic coasts, and, during the 30th and 31st, the high area moved off to the northeast over Nova Scotia. The morning observations of the 27th, showed a fall in temperature of 17° to 24° in Minnesota, and 15° in the extreme northern portion of the Missouri valley. The number of hours that elapsed before the cold wave reached the other districts and its effect were as follows: Missouri valley, eight hours, fall in temperature, 15° to 20° (the minimum occurred in northern portions on the morning of the 27th, and in southern portions on the morning of the 28th); Tennessee and Ohio valley, six-

teen to twenty-four hours, fall in temperature from 20° to 30° , the minimum occurring on the morning of the 28th; Gulf states, twenty-four to thirty-two hours, fall in temperature, 10° to 20° ; the minimum generally occurred on the morning of the 28th; Atlantic coast, forty hours, fall in temperature, 20° to 30° , the minimum occurring on the morning of the 28th, except in the eastern portion of the east Gulf states, where the minimum occurred on the morning of the 29th.

AREAS OF LOW BAROMETER.

On chart i. are traced the paths of the centres of eleven areas of low barometer, which are herein described.

The following table shows the latitude and longitude in which the centre of each area was first and last located, and the average hourly movement.

Areas of low barometer.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
No. I	0° 0'	0° 0'	0° 0'	0° 0'	26.0
II	52° 00'	113° 00'	50° 00'	86° 00'	30.9
III	27° 00'	97° 00'	50° 00'	64° 00'	32.8
IV	52° 30'	111° 30'	49° 30'	62° 30'	57.6
V	53° 00'	110° 30'	49° 30'	61° 00'	33.9
VI	31° 30'	94° 00'	45° 00'	67° 30'	33.5
VII	51° 30'	95° 00'	49° 00'	59° 00'	28.1
VIII	51° 00'	112° 30'	50° 30'	90° 00'	42.7
IX	39° 00'	102° 30'	50° 30'	66° 00'	39.6
X	47° 00'	82° 00'	50° 30'	62° 30'	43.7
XI	44° 30'	100° 30'	45° 00'	61° 30'	46.7
Mean hourly velocity					37.8

I.—This area first appeared in the Saskatchewan valley on the afternoon of the 3d. Its course was generally southeasterly, passing just north of Lake Superior. It caused in the lake region cloudy weather during the day, and light snows during the night of the 3d, which continued in the upper lake region on the 4th. Maximum velocities of twenty-six miles at Milwaukee, Wisconsin; thirty-six miles at Grand Haven, Michigan, and thirty-two miles at Buffalo, New York, were reported on the 4th. During the 3d and 4th, the winds in the upper Mississippi and Missouri valleys, and the lake region, were from the south.

The observer at Fort Assinaboine, Montana, reports the following: "a high southwesterly wind set in at 5. a. m. on the 3d; it soon afterwards increased to the force of a gale which continued until late in the evening. The wind movement for the sixteen hours ending at 8.41 p. m., was five hundred and fifty-nine miles, or an average of thirty-five miles per hour, the maximum being fifty-three miles."

II.—This low area first appeared on the Texas coast near Brownsville. The afternoon report of the 3d indicated its approach, and by midnight the wind had attained a velocity of twenty-nine miles per hour at Indianola, Texas. The centre was near Brownsville on the afternoon of the 4th and passed rapidly to the north, moving over the lake region on the 6th. Rain began in Texas on the 3d; it also occurred on the same day in the south Atlantic and Gulf states. On the 3d and 4th there was a decided fall in the barometer in all districts east of the Rocky mountains, caused by the movement of low area i. from the northwest and low area ii. from the southwest. Rain continued to fall in the west Gulf states during the 4th and 5th, and fell in the south Atlantic and east Gulf states on the 3d, 4th, 5th, and 6th, the weather clearing during the night of the 6th. Rains occurred on the 5th and 6th in all districts east of the Rocky mountains and north of Tennessee. The following wind velocities were reported during the passage of this storm: Galveston, Texas, twenty-six miles, and Indianola, Texas, forty miles on the 4th. In the lake region and on the Atlantic coast, north of Hatteras, from twenty-six to forty-four miles on the 6th, and high northwest winds on the Atlantic coast on the 7th.

The following notes are from the reports of the Signal Service observers:

Indianola, Texas, 4th: during the early morning a high east-erly wind prevailed. Vessels arriving at this port reported having experienced rough weather on the Gulf.

Jacksonville, Florida, 6th: during the afternoon the wind became variable in direction, and blew in violent squalls, causing considerable damage in this vicinity; the schooner "Warren Potter" broke from her moorings.

Buffalo, New York: a storm from the southwest began at 12.55 a. m. of the 7th and continued until 12.15 p. m.; it was most severe at 4 a. m., when a wind velocity of forty-nine miles was recorded.

Rochester, New York: high winds prevailed on the 6th and 7th; a velocity of thirty-four miles occurring on the latter date.

Barnegat City, New Jersey: the bark "Aberdeen" went ashore six miles south of this station at 6.15 a. m. on the 6th; a high wind and heavy sea prevailed at this station.

III.—This area appeared in the Northwest Territories on the morning of the 7th, passed north of the lake region on the 8th, reaching the Saint Lawrence valley on the 9th, and disappeared over the Gulf on the 10th. Its effect was slight, causing only light snows in portions of the lake region and New England. The highest winds were from the northwest after the storm-centre had passed. Maximum velocities of twenty-five to thirty-nine miles were reported in the lake region, and from twenty-five to forty-eight miles on the Atlantic coast. In advance of the storm-centre the temperature generally rose about 10° .

The observer at Oswego, New York, reports the following: "high winds prevailed from 6.35 p. m. of the 9th until 4.15 p. m. on the 10th; the storm reached its greatest force, thirty-nine miles per hour, at 6.57 a. m. on the 10th. Some buildings in this city were damaged."

No. IV.—This low area first appeared in the same locality as did low areas i. and iii. Starting in the northwest at midnight of the 9th, the centre was near Lake Superior at midnight of the 10th, but an area of comparatively low barometer extended from this centre southwesterly as far as Kansas. The barometer changes in the following eight hours were such as to change the locality of lowest pressure from the northeast to the southwest end of the trough of low pressure, and the centre of the storm on the morning of the 11th was in Kansas and completely surrounded by the isobar of 29.50. From this point it moved to the northeast, the pressure at the centre decreasing to 29.30 as it passed over the lakes, and to 29.00 in the Maritime Provinces. Precipitation occurred in the Mississippi valley and all districts to the east of it on the 11th, generally as rain, but, in the northern districts, turning into snow. Cloudy weather, with rain or snow, continued in the lake region and in the districts on the Atlantic coast on the 12th. Maximum velocities of twenty-eight miles on the Texas coast, forty miles in the lake region, and twenty-five to forty-seven miles on the Atlantic coast, were reported. A warm wave, represented by a rise in temperature of 10° to 30° preceded the centre.

The Signal Service observers report the following:

Fort Macon, North Carolina: high winds prevailed during the night of the 11-12th, and continued until 2.45 p. m.; from 9.10 to 9.25 a. m., a wind velocity of seventy miles was recorded, the anemometer showing a velocity of eighty-three miles for five minutes. The coast telegraph line was blown down, and some small boats in Beaufort harbor were damaged.

Fort Myer, Virginia, 12th: high winds prevailed during the greater part of the day, at times blowing at the rate of forty miles per hour.

Rochester, New York, 12th: high winds prevailed from 4 a. m. until the early morning of the 13th; a velocity of forty miles per hour occurred at 12.35 p. m. on the 12th.

Boston, Massachusetts, 12th: a severe westerly storm prevailed during the day, the wind reaching a velocity of forty-two miles, south, at 8.45 a. m. The storm caused much damage along the coast and in this city also. At Plymouth a church steeple was blown over and carried a distance of one hundred yards.

Portland, Maine, 12th: a high southeasterly wind began at 5.45 a. m., reaching a velocity of forty miles at 9.40, and ending 1.15 p. m. A number of telephone wires were blown down during the storm. The high wind caused considerable damage at Bangor also.

Eastport, Maine: the storm began at about midnight of the 11-12th, and continued at intervals until about 6.30 p. m. on the 12th; its greatest force was attained at 1.12 p. m., when a velocity of forty-two miles, south, was recorded. Several vessels in the harbor dragged anchor, and the schooners "Anna Bell" and "Northern Star" broke from their moorings; the "Northern Star" was blown on Pain's Ledge and sank.

V.—The centre of this low area moved from Texas (where it appeared on the morning of the 15th) in a northeasterly direction, reaching the lower lake region on the 16th, and passing off the New England coast on the afternoon of the 17th. Rain and snow occurred in all districts east of the Rocky mountains on the 15th and 16th, the weather generally clearing in all districts on the 17th. The following maximum wind velocities were reported: Indianola, Texas, forty-nine miles on the 15th; Galveston, Texas, thirty-four miles on the 16th; in the lake region, twenty-five to forty-five miles, except at Rochester, New York, sixty miles, and at Buffalo, New York, seventy-one miles during the night of the 16th. The temperature rose from 5° to 10° in all districts east of the Missouri valley on the 14th; the rise continued in the lower lake region, Tennessee, the Ohio valley, and the districts on the Atlantic coast no the 15th, and in the middle and south Atlantic states on the 16th.

The following notes relating to this storm have been received from Signal Service stations:

Norfolk, Virginia: at 8.30 a. m. on the 17th the wind attained a velocity of thirty-seven miles from the west, which is the highest velocity recorded here since February, 1881. Buildings were blown down, telegraph lines prostrated, and other damage caused. The Coast Survey steamer "Ready" dragged anchor in this harbor during the storm. No disasters to shipping occurred. The warning given by the signal display was generally heeded.

Fort Myer, Virginia, 16th: the barometer fell steadily all day, declining .51 from 7 a. m. to 11 p. m.; at 10.40 p. m. the wind became high, and at midnight the velocity was estimated at fifty miles per hour.

Baltimore, Maryland: from midnight of the 16-17th to 3 a. m., the wind was fresh from south and southeast; at 3 a. m. it veered to southwest and blew with increased force; at 5 a. m. it was northwest, and at 9.15 a. m. a velocity of thirty-seven miles was recorded. Considerable damage was done in this city. On Chesapeake bay the storm is reported to have been the severest experienced since October, 1878. The steamers "Nio" and "Byrn Glas" collided during the storm, the former sustaining serious damage; the bark "May Queen" was blown from her moorings and slightly damaged.

Toledo, Ohio, 16th: a high wind prevailed from 1.30 to 4 a. m., a velocity of thirty-four miles per hour, occurring at 2 a. m.; from 4 a. m. to 5 p. m., the wind was brisk; at the latter hour it increased, and at 5.35, twenty-six miles, southwest, occurred, followed during the evening by sleet and a blinding snow-storm. The snow drifted so as to cause the delay of trains on all railroads entering this city.

Buffalo, New York: the barometer fell rapidly during the 16th, and until 1 a. m. on the 17th, with fresh to brisk northeast winds; after 1 a. m. the barometer rose rapidly; at 3.35 the wind veered suddenly to southwest, and blew with the force of a gale. The storm continued all day, throughout the 18th, and until 5.40 a. m. on the 19th. A maximum wind velocity of seventy-one miles per hour occurred at 5.25 a. m. on the 17th; considerable damage was done in this city and vicinity. Reports from Niagara Falls state that the storm of the 16-18th was one of the severest that has occurred for many years. The wind blew with hurricane force, prostrating trees and telegraph poles, and unroofing buildings.

Rochester, New York, 17th: at 4.10 a. m. the wind suddenly

increased to the force of a gale; a velocity of sixty miles was recorded between 4.20 and 8 a. m. This storm was the severest of the year, and caused much damage in this vicinity. More than four hundred telephone wires and many telegraph poles were prostrated.

Mount Washington, New Hampshire, 17th: the barometer fell rapidly during the day, the lowest reading, 29.24, was observed at 7 p. m. The wind veered from south to west, and increased to hurricane force; at 9.43 p. m. the anemometer cups were blown away when the wind was blowing at the rate of one hundred miles per hour. The hurricane continued during the early morning of the 18th the wind attaining a velocity of one hundred and one miles.

Boston, Massachusetts, 17th: a westerly storm prevailed from 12.15 p. m. until 4 a. m. on the 19th. A wind velocity of forty miles, west, occurred a 4.45 p. m.

Eastport, Maine, 16th: the storm began at 6.12 p. m., and continued until 8.52 a. m. on the 17th, the wind attaining a velocity of forty-eight miles per hour from the northeast at 6.04 a. m. This storm was of unusual severity along the coast, and caused much damage to shipping interests. One steamer and eighteen schooners remained in port during the display of cautionary signals.

VI.—This low area passed from Manitoba to the Gulf of Saint Lawrence between the 19th and 21st. The lowest pressure being represented by the isobar of 29.90 while in Manitoba, the pressure at the centre had decreased to 29.40 when it reached the Saint Lawrence valley. Local snows occurred in the lake region, and in New England on the 20th and 21st. The highest wind velocities occurred after the centre had passed, and the wind had shifted to the northwest. Velocities of thirty-eight miles in the lower lakes, thirty-seven on the New England coast, and forty-nine on the middle Atlantic coast were reported. The warm wave accompanying the fall in pressure reached the lake region on the 19th, and on the 20th, extended to the Atlantic coast, and passed off on the afternoon of the 21st. Velocities from twenty-five to thirty-six miles in the lake region, and from twenty-five to forty miles on the Atlantic coast, were reported.

VII.—This area passed eastward from the Northwest Territories and north of the lake region, between the afternoon of the 21st and the morning of the 23d. It had but a slight effect on the weather conditions in the United States. Local snows occurred in the upper lake region on the 22d and 23d, with a maximum wind velocity of twenty-eight miles, reported from Milwaukee, Wisconsin. The midnight report of the 21st showed a rise in temperature of 20° in the extreme northwest. This warm wave extended as far east as the lower lakes and Tennessee on the 22d, and reached the Atlantic coast on the 23d, and in New England and the middle Atlantic states the temperature continued to rise during the 24th and 25th. This continued rise in temperature during the 24th and 25th was, however, caused by the development of low area viii. on the afternoon of the 23d.

VIII.—The centre of this low area appeared in Colorado on the afternoon of the 23d, completely surrounded by the isobar 29.70. The pressure at the centre decreased from .10 to .15 as it passed to the northeast. At midnight of the 23d rain or snow was reported from all districts east of the Rocky mountains, where it continued on the 24th and still continued in the lake region and on the Atlantic coast on the 25th. The highest wind velocity reported in the lake region was thirty-six miles, at Grand Haven. The effect of this area on the temperature was, as stated in the description of low area vii., a continued rise in the eastern districts during the 24th and 25th.

IX.—This low area appeared north of Lake Huron at midnight of the 25th, accompanied by rain in the lower lake region. It passed during the next day into the Saint Lawrence valley. Local snows occurred on the 26th in New England. Maximum velocities of twenty-five to fifty-three miles occurred in the lake region, and from twenty-five to forty-one miles on the Atlantic coast were reported.

The observer at Buffalo, New York, reports the following: "A southwesterly storm began at 2.45 p. m. of the 26th, and continued all day, the wind reaching a velocity of fifty-three miles per hour at 7.25 p. m.; the storm was accompanied by snow which drifted badly and obstructed railroad travel."

X.—This low area appeared on the afternoon of the 26th; by midnight the centre was near Leavenworth, Kansas, where the barometer read 29.88. The pressure at the centre had fallen to 29.70 when it reached the Ohio valley, and still further decreased to 29.50 on the New England coast, and to 29.00 as it passed over Nova Scotia. Snow in the lake region and the upper Mississippi valley and rain in Tennessee and the Ohio valley fell on the 27th and in the lake region and New England on the 28th. High winds prevailed in the lake region and on the Atlantic coast on the 27th and 28th. Maximum velocities of twenty-nine miles in the lower lake region and from thirty-six to forty-four miles on the middle Atlantic and New England coasts were reported. The temperature rose from 10° to 20° in the Missouri valley and southward to include the west Gulf states on the 26th. On the 27th this warm wave moved into the south Atlantic states and thence up the Atlantic coast.

The observers at Portland and Eastport, Maine, report, as follows:

Portland, Maine, 28th: the storm began at 3.50 a. m. and continued with great severity until 6.15 p. m.; snow fell to a depth of ten inches. Mariners consider this storm to have been the severest experienced for many years. Reports from all along the coast on the 29th stated that the storm was of unusual violence and caused much damage. The schooner "Arcana," from Portland to Bear River, Nova Scotia, went ashore on Quaco Reef at 2 a. m., and the schooner "Australia" was wrecked at the Two Lights, about ten miles from this port.

Eastport, Maine, 28th: the storm set in at about 3 a. m. and continued until the early morning of the 29th; it was most severe between 4 and 5 p. m., a wind-velocity of fifty-two miles per hour from the south, having been recorded at 4.22 p. m. The schooner "Chas. F. Jeffrey" went ashore in Romney bay and lost deck load; several wrecks occurred on the New Brunswick and Nova Scotia coasts. A large number of boats remained in this harbor during the signal display for this storm, which is considered one of the severest experienced on this coast for many years.

The "New York Herald," of January 30, 1885, contained the following:

SAINT JOHNS, N. F., January 28, 1885.—The telegraph stations at Rose Blanche and Channel report a fearful northwest blizzard yesterday and last night. The whole codfishing fleet were moored on the ground when the storm occurred. Some twenty-three were driven off and their safety, being all open boats, is despaired of. One skiff sank at the entrance to Rose Blanche and the crew perished. From Petits, Lecou, and neighboring fishing settlements other craft are missing. Some fifty to sixty fishermen are yet unaccounted for. Many of the surviving fishermen were severely frost-bitten.

XI.—This low area appeared north of Montana at midnight of the 30th; during the next day it reached the lake region, and at the last report of the month was central in northern Michigan. At this report snow was falling in the upper lake region, and rain in Tennessee. The wind in the upper lake region had shifted to northwesterly, and a maximum velocity of twenty-seven miles was reported from Grand Haven, Michigan.

NORTH ATLANTIC STORMS DURING JANUARY, 1885.

[Pressure expressed in inches and in millimetres; wind-force by scale of 0-10.]

The paths of the depressions that have appeared over the north Atlantic ocean during the month are determined, approximately, from international simultaneous observations furnished by captains of ocean steamships and sailing vessels; abstracts of logs and other data collected by the Signal Service agencies at the ports of New York, Boston, and Philadelphia; reports obtained through the co-operation of the "New York Herald Weather Service," and from other miscellaneous data received at this office up to January 25th, 1885.

The attention of international co-operating observers is called to the change in the time of recording the simultaneous observation, which is now taken at 7 a. m., seventy-fifth meridian (eastern) time, corresponding to noon Greenwich time, or eight minutes earlier than heretofore.

Nine depressions are traced over the north Atlantic ocean within the region covered by the reports. Of this number seven are storms which originated in the United States or Canada, and, reaching the Gulf of Saint Lawrence and the Maritime Provinces, continued to move in a northeasterly direction over the ocean. Number 1 was probably a continuation of the depression traced as number 7 on the chart for December, 1884; the remaining disturbance, number 7, appeared off the New Jersey coast on the 24th, when the storm described as low area viii., under "Areas of low barometer," was central in the lake region.

The weather during January, 1885, over the Atlantic ocean north of the forty-fifth parallel, and also along the coast of the United States, was very stormy, the month being marked by constant and violent gales from ssw. to w. and nw. The winds attained their maximum force, generally, after shifting to w. and nw., and were accompanied by a rapid fall in temperature, especially over the region west of the forty-fifth meridian. From the 18th to the 21st an area of barometric minima apparently existed over the ocean between W. 20° and the Iberian peninsula and northeastward to the Bay of Biscay.

The most violent storms of the month were those which occurred between the 23d and 31st, during which period the barometer ranged from 28.5 (723.9) to 29.5 (749.3) over the region north of 45° N. and from the Banks eastward to the European coasts. During these gales numerous trans-Atlantic steamers sustained damage to boats, deck fittings, &c.

The following are brief descriptions of the depressions charted:

1.—This was probably a continuation of a disturbance that occupied mid-ocean at the close of December, when the minimum pressure was about 29.2 (741.7). On January 1st the s. s. "Wisconsin," Bentley commanding, reported a strong nw. gale from 4 a. m. to 1 p. m., in N. 48° , W. 36° , the lowest barometer observed being 29.14 (740.1), at 4 a. m. The s. s. "Borderer," Jno. Hill commanding, had barometer 29.5 (749.3) at about 11 p. m., in N. 49° , W. 35° , wind blowing a moderate gale from wnw. and w., with heavy rain; and the s. s. "Lake Champlain," M. L. Tranmar commanding, experienced a whole gale which began on December 31st and ended January 1st, the barometric minimum, 29.32 (744.7), occurring at 9 a. m. of the 1st, with wind from nnw. to nw. and wsw. Captain Tranmar reported the winds during the passage as mostly from wsw. to nw., unsteady as to force, and with constant hail, rain, and snow, and very disturbed sea. During the 2d and 3d, the disturbance apparently moved northeastward to the western coasts of the British Isles.

2.—This was a continuation of the depression traced over the American continent as low area ii. At midnight of the 7th, it was central over the northern part of the Gulf of Saint Lawrence with pressure below 29.0 (736.6). On the 8th, the disturbance was central between W. 45° and the Newfoundland coast, the pressure over the Banks ranging from 29.5 (749.3) to 29.8 (756.9), with strong breezes to moderate gales from ssw. to w. The disturbance moved east-northeastward during the 9th and 10th, attended by increasing sw. to nw. gales and generally threatening weather over the region between W. 40° and 20° and from N. 45° to 55° . On the 10th the lowest reported barometer reading was 29.13 (739.9) in N. 55° , W. 15° with strong w. gale, the centre of the depression being probably to the northeastward of that position.

3.—This was probably a continuation of the depression elsewhere described in this REVIEW as low area iii. During the afternoon and night of the 10th it passed over the Gulf of Saint Lawrence and Newfoundland and on the 11th the centre was near N. 47° , W. 47° , where the barometer read 29.4 (746.7). Moderate ssw. and sw. gales occurred between W. 45° and New-

foundland, while strong w. and nw. gales prevailed over the region west of the fifty-fifth meridian. During the day the depression appears to have moved north-northeastward, and on the 12th it was shown to the northward of 55° N. and west of the thirtieth meridian, the lowest readings being about 29.6 (751.8); during the day the disturbance passed beyond the range of the observations. Steep gradients existed over the region to the southwest and south of the area of low barometer, causing strong w. and nw. gales.

4. This depression was a continuation of that charted over the United States and Canada as low area iv. At midnight of the 12th the centre was over the Gulf of Saint Lawrence; it moved slowly in a direction slightly south of east, and on the following morning the centre was near the southern coast of Newfoundland. Severe electrical storms occurred in the southeast quadrant of this depression on the night of the 12th.

Captain Rigby, commanding the s. s. "Wyoming," reported that a gale set in from s. at 8 p. m. of the 12th, veering to sw. at midnight, to w. at 2 a. m. of the 13th, and to nw. at 8 a. m.; the barometer was lowest, 29.81 (757.2), at 4 a. m. of the 13th and had been falling since noon of the preceding day. The gale was at its height (force 10) at 2 a. m. of the 13th, at which force it blew for about an hour, and by 8 a. m. it had fallen to a light breeze. The ship's position at the time the gale was most violent was N. 43° , W. 60° . Between 10.30 p. m. and midnight of the 12th the compasses were very much disturbed, all of them, four in number, jumping around the circle several times both ways. No lightning was observed, but the pilot who was taken aboard reported a lightning display early in the evening in the vicinity of Sable Island.

Captain Kelly, commanding the s. s. "British King," reported that when off George's Banks on the 12th he passed through a most unusual and violent electrical storm which lasted from 6 p. m. to 9 p. m. From 6.45 to 8 p. m. rain fell in torrents and the peals of thunder were deafening; the lightning was a continuous blaze and was so intense and blinding that a lookout was impossible, and the ship was stopped to lessen the danger of collision. The yard-arms and masts were tipped with Saint Elmo's fire.

On the 14th the observations indicated the presence of the disturbance off the eastern coast of Newfoundland, but the disturbance was probably of small diameter as the barometric observations were not below 30.0 (762.0). On the following day, however, the disturbance appears to have increased in area, while the pressure had fallen to 29.5 (749.3); from W. 50° eastward to 30° , and from N. 45° to 52° , strong sw. to nw. gales were reported, the pressure within the above limits ranging from 29.5 (749.3) to 30.1 (764.5). During the 16th and 17th the depression continued to move in a course slightly south of east, attended by moderate to strong gales from se. to nw., and on the 18th it probably became merged in an area of low pressures which occupied the ocean south of 45° N., and between W. 10° and 20° .

5.—This was a continuation of low area v.; it passed off the New England coast and over Nova Scotia during the night of the 17th as a severe storm, the pressure when last observed at land stations, being 28.97 (735.8). On the 18th it was central on the Banks of Newfoundland: several steamers encountered the gales produced by this depression, which were very severe, the most violent gales occurring after the wind had shifted to westward when they were reported as blowing at the rate of seventy to eighty miles an hour. The lowest pressures reported ranged from 29.1 (739.1) to 29.3 (744.2). During the 18th the depression passed rapidly northeastward and on the 19th it was shown near N. 52° , W. 33° , with no material change in pressure and no abatement in the force of the w. and nw. gales which followed in its rear. During the 20th and 21st, there was a decrease in the barometric gradients over the ocean and a corresponding decrease in the force of the winds, although these still continued to blow with a force of 7 to 8. On the 22d, the disturbance was off the southwestern coast of Ireland.

6.—This was a continuation of low area vi., which was central

over the western part of the Gulf of Saint Lawrence at midnight of the 21st. On the 22d the centre was near the south-eastern coast of Newfoundland, the lowest barometer reported being 28.66 (728.2); heavy nw. gales prevailed along the coast of the United States southward to the thirtieth parallel, with westerly gales from Nova Scotia to the Banks and s. and se. gales to the eastward of W. 50° . During the 23d, 24th, and 25th the disturbance moved northeastward, accompanied by furious gales from s. to w. and nw., the pressure near the centre being less than 28.8 (731.5).

The following vessels reported pressures below 29.0 (736.6): s. s. "Republic," Captain Irving, commander, in N. $45^{\circ} 35'$, W. $50^{\circ} 0'$, barometer 28.66 (728.0) on the 22d, wind from se. to wnw., force varying from 7 to 10; s. s. "Lake Champlain," M. L. Tranmar, commanding, 23d, at 4 a. m., barometer 29.0 (736.6), heavy squalls; so dense was the snow in the squalls that the masthead light was obscured from the bridge; 8 a. m., barometer 28.98 (736.1), strong gale from nw. by w.; same weather at noon; ship's position, N. $45^{\circ} 33'$, W. $41^{\circ} 38'$. During the afternoon the gale continued from wnw. with very high and dangerous sea, barometer rising; midnight, barometer 29.4 (746.7), lightning to the northward, heavy snow squalls. S. S. "State of Georgia," G. Moodie, commanding: "23d, 9 a. m., the barometer, which had risen to 29.3 (744.2), again fell to 28.96 (735.6), wind s. 56 w., force 9, and continued to fall until 9.30 p. m. (12 hours 24 minutes, Greenwich time), when it read 28.87 (729.0) in latitude $48^{\circ} 25'$ N., longitude $43^{\circ} 27'$ W.; from this the rise was very slow and the wind blew with a force of 9-10 for more than thirty-six hours." The s. s. "Rhynland," J. C. Jamison, commanding, in N. $48^{\circ} 57'$, W. $40^{\circ} 10'$, on the 23d had barometer 28.9 (734.0), whole gale from s. to w. and nw. S. S. "Waesland," J. Ueberweg, commanding, in N. $48^{\circ} 05'$, W. $34^{\circ} 16'$, on the 23d had barometer 28.5 (723.9), whole gale from ne. to e., se. and s., and thence to sw. and w. All vessels reported very high westerly sea during these gales. The stormy weather continued until the 25th, when it began to moderate somewhat over the region east of 30° W. On the 26th the depression was off the Irish coast with the pressure, as reported, about 29.6 (751.8).

7.—This depression appeared off the New Jersey coast on the morning of the 24th, when the barometer near the centre read 29.4 (746.7); it moved northeastward along the coast of Nova Scotia, attended by moderate e. gales to the northward and w. gales to the southward and westward of the centre. It continued its northeasterly movement during the 26th, and on the 27th it probably merged in the depression described as 8, which was then central near N. 50° , W. 45° .

8.—This was a continuation of the depression which moved over Canada during the 25th and 26th, and elsewhere described as low area ix. At midnight of the 26th it occupied the mouth of the Saint Lawrence river, whence it moved with decreasing pressure over the northern part of Newfoundland, and on the 27th was shown near N. 50° , W. 45° . Its passage was attended by severe w. gales from the coasts of the United States to the fiftieth meridian. On the 27th, vessels between N. 45° and 50° , and W. 40° and 48° , reported pressure ranging from 28.7 (729.0) to 29.0 (736.6). On the 28th the atmospheric pressure over the region between N. 48° and 55° , and W. 40° and 25° , ranged from 28.5 (723.9) to 28.88 (733.5) while an increase had set over the region to the westward of the fortieth meridian. Westerly gales of hurricane force, with squalls of hail, snow and sleet, were experienced by all vessels reporting. The sea was very high during these gales; the s. s. "City of Montreal" A. Redford, commanding, reported, on the morning of the 27th, the barometer began to fall and on reaching 28.76 (730.5) the weather became worse and a severe gale set in from sw. which lasted until noon of the 28th, (vessel's position between N. $47^{\circ} 45'$, W. $42^{\circ} 00'$ and N. $48^{\circ} 48'$, W. $34^{\circ} 00'$). Serious damage was done by the heavy seas which reached at least an altitude of forty feet during the gale. During the 29th and 30th, the depression moved northeastward, the barometer and state of the weather remaining unchanged during

those dates. On the 30th the disturbance was off the British coasts.

In connection with this storm, Captain B. Gleall, commanding the s. s. "Celtic," in about N. $47^{\circ} 39'$, W. $40^{\circ} 18'$, furnishes the following letter:

It commenced on the 27th at 10 a. m., ship's time, with the wind from sse., (true) force 6, light rain, and barometer falling rapidly. 11.30: suddenly shifted to sw., thence gradually veered w. by s., and increased to force 8. Noon: barometer 28.85 (732.8), stopped falling. 1 p. m.: barometer 28.90 (734.0), began to fall again, and wind backed sw. by s., force 9. 3.30 p. m.: barometer 28.79 (731.3), began to rise again, and wind veered w. by s. 10 p. m.: barometer 28.94 (735.1), storm at its height, force 11-12, and continued with unabated fury and gradually rising barometer until the 28th, 6 p. m., when the wind veered to w. without any abatement in force until 2 p. m., when it gradually moderated to a strong gale, afterwards moderating to a strong breeze at midnight, then it veered to nw., and moderated to light breeze. Encountered a very high northerly swell next day, 29th. It may be of interest to note that the speed of ship during the height of the storm, had to be reduced to three knots per hour, and ship's head brought end on to the sea, in order to avoid doing damage; as it was, we had two boats disabled.

9.—This disturbance was a continuation of that charted as low area x., which moved into the Atlantic from the New Jersey coast and thence northeastward to Nova Scotia during the 28th. On the 29th it was near the southern coast of Newfoundland; from that date until the close of the month it moved northeastward, causing a continuance of the severe gales which accompanied number 8. This disturbance closely followed the preceding, the combined system forming an extensive area of low barometer, within which the pressure ranged from 28.4 (721.3) to 29.3 (744.2) over the region from N. 45° northward, and between the forty-fifth meridian and the European coasts, while strong gales from sw. to nw. prevailed as far south as the thirty-fifth parallel.

OCEAN ICE.

On chart i., are exhibited the eastern and southern limits of the region within which icebergs have been observed during January, 1885. These limits are determined from reports furnished by shipmasters, and from data published in the "New York Maritime Register."

During the month icebergs have been reported between W. $45^{\circ} 30'$ and W. $42^{\circ} 24'$. None were observed south of the forty-seventh parallel.

In January, 1885, they were observed about 11 days earlier than in the same month of last year, and were about 4° farther to the eastward than those of January, 1884.

In January, 1883, the first icebergs reported were seen in N. $47^{\circ} 35'$, W. $45^{\circ} 04'$, on the 30th; in 1882 the first icebergs were seen in N. $47^{\circ} 30'$, W. $48^{\circ} 35'$, also on the 30th.

Icebergs were reported in January, 1885, as follows:

January 13th.—S. S. "City of Montreal," in N. $47^{\circ} 33'$, W. $42^{\circ} 56'$, passed an iceberg 600 feet long and 80 feet high; s. s. "Siberian," in N. $47^{\circ} 27'$, W. $43^{\circ} 24'$, passed a large iceberg.

January 31st.—S. S. "Ethiopia," at 5 a. m. passed a large iceberg in N. $48^{\circ} 43'$, W. $42^{\circ} 24'$; from 7 a. m. to noon, in N. $48^{\circ} 20'$, W. $43^{\circ} 24'$, passed five large icebergs; from noon to midnight, in N. $47^{\circ} 32'$, W. $45^{\circ} 30'$, passed six large icebergs.

SIGNAL SERVICE AGENCIES.

Signal Service agencies have been established in the Maritime Exchange buildings at New York and Philadelphia, and in the Custom House at Boston, where the necessary blanks and other information will be furnished to shipmasters.

The following circular explains the object of these agencies:

UNITED STATES OF AMERICA,
SIGNAL OFFICE, WAR DEPARTMENT,
Washington City, November 29, 1884.

SHIP-MASTERS: It is now generally known that a large percentage of American storms travel across the Atlantic and in a few days after leaving our coast affect the weather conditions of Europe. Ship-masters' observations prove this, and Captain Henry Toynbee, Marine Superintendent of Great Britain, who has investigated the subject with much vigor, says: "ENE., thirty to forty miles an hour, has been adopted as a rough estimate of the track and speed of storms crossing the Atlantic until they arrive off

the west coasts, when they are affected by the disposition of pressure over western Europe."

How important it is, then, for the ship-master about to sail to America from European ports to know the probable weather conditions he is likely to have on his westward passage, or where he will be likely to encounter a storm or hurricane at sea.

The London Meteorological office will now make an earnest effort to make such predictions, and, in connection therewith, the United States Signal Service, at the solicitation of the Meteorological Council of Great Britain, has accepted an invitation to lend assistance in this important movement to benefit the commerce of the whole world, and will collect meteorological information from ship-masters arriving in New York and Boston and cable the same to the London Meteorological Office. From this point bulletins and warnings will be issued and telegraphed in times of great danger to all European seaports.

* * * * *

I am, very respectfully, your obedient servant,

W. B. HAZEN,
Brig. & Bvt. Maj. Gen'l,
Chief Signal Officer, U. S. A.

In pursuance of the arrangements made with the Meteorological Office of London, England, there have been cabled to that office from New York twelve reports of storms encountered by vessels on the Atlantic west of the forty-fifth meridian. Three messages were sent from Boston.

TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

The distribution of mean temperature over the United States and Canada for January, 1885, is exhibited on chart ii. by the dotted isothermal lines; and in the table of miscellaneous data are given the means for the various stations of the Signal Service.

In the following table are given the mean temperatures for the several geographical districts with the normals and departures, as deduced from the Signal Service observations:

Average temperatures for January, 1885.

Districts.	Average for Jan. Signal-Service ob- servations.		Comparison of Jan., 1885, with the average for several years.
	For sev- eral years.	For 1885.	
New England	0	0	0
Middle Atlantic states	26.1	26.1	0.0
South-Atlantic states	33.2	33.8	+ 0.6
Florida peninsula	47.1	47.3	+ 0.2
Eastern Gulf states	61.5	61.5	0.0
Western Gulf states	48.9	45.7	- 3.2
Rio Grande valley	47.4	43.5	- 3.9
Tennessee	58.3	51.8	- 0.5
Ohio valley	39.7	34.8	- 4.9
Lower lake region	32.3	26.8	- 5.4
Upper lake region	20.1	21.6	- 4.5
Extreme northwest	18.7	12.3	- 6.5
Upper Mississippi valley	4.3	2.2	- 6.5
Missouri valley	23.2	16.2	- 7.0
Northern slope	16.4	9.8	- 0.6
Middle slope	17.6	16.8	- 0.8
Southern slope	25.5	20.8	- 4.7
Southern plateau	43.3	38.8	- 4.5
Middle plateau	40.9	39.8	- 1.1
Northern plateau	28.9	30.2	+ 1.3
North Pacific coast region	29.1	23.8	- 5.3
Middle Pacific coast region	39.0	39.9	+ 0.9
South Pacific coast region	47.1	45.4	+ 1.3
Mount Washington, N. H	53.1	53.0	- 0.1
Mount Washington, N. H	5.4	0.7	- 4.7
Pike's Peak, Colo	2.4	1.4	- 1.0

On chart iv. the deviations from the normal temperature are graphically exhibited by the dotted lines connecting stations of equal departure. At nearly all stations on the Atlantic coast, in western Montana, and on the Pacific coast except in the Columbia valley, the mean temperature for January, 1885, has been above the normal, but the departures have exceeded 3° at but few stations, viz: Helena, Montana, $+4.9$; Roseburg, Oregon, $+3.5$; Delaware Breakwater, Delaware, $+3.2$; Chincoteague, Virginia, and Kitty Hawk, North Carolina, $+3.1$. In the Gulf states and in all of the interior districts with the exception of western Montana, the mean temperature has been below the normal, the departures being greatest in Kansas, Nebraska, the lake region, and in the upper Mississippi, Missouri and Ohio valleys. In these dis-

tricts the month was unusually cold, the mean temperature generally averaging from 6° to 11° below the normal. At Milwaukee, Wisconsin, and Duluth, Minnesota, the departures were $10^{\circ}.1$ and $11^{\circ}.9$ below the January normal for fourteen and thirteen years, respectively, these being the most marked departures for the month. In portions of Idaho, Oregon, and Washington Territory, the mean temperature has also been decidedly below the normal, the departures amounting to $-6^{\circ}.3$, and $-8^{\circ}.1$ at Boise City and Lewiston, Idaho, respectively.

RANGES OF TEMPERATURE.

The monthly and daily ranges of temperature at the various Signal Service stations are shown in the table of miscellaneous meteorological data. The monthly ranges were greatest in California, Nebraska, and Kansas and from Minnesota westward to Idaho; they were least in southern Florida and along the Pacific coast. The largest monthly ranges were: Fort Benton, Montana, 90° ; Fort Bennett, Dakota, $88^{\circ}.4$; West Las Animas, Colorado, $88^{\circ}.3$; Mount Washington, New Hampshire, 87° ; and Saint Vincent, Montana, 85° . The smallest monthly ranges were: San Francisco, California, $18^{\circ}.5$; Cape Mendocino, California, $21^{\circ}.6$; Key West, Florida, $23^{\circ}.1$; Sacramento, California, $27^{\circ}.8$; San Diego, California, $29^{\circ}.4$.

DEVIATIONS FROM MEAN TEMPERATURE.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of average temperatures for the various districts, in the table of miscellaneous data, and on chart iv. The following notes in connection with this subject are reported by voluntary observers:

Arkansas.—Lead Hill, Boone county: mean temperature, $28^{\circ}.8$, is $2^{\circ}.3$ below the January average for the three preceding years.

Dakota.—Webster, Day county: mean temperature, $4^{\circ}.2$, is $3^{\circ}.6$ above the January average for the two preceding years.

Illinois.—Anna, Union county: mean temperature, $25^{\circ}.9$, is $7^{\circ}.2$ below the January average for the last ten years.

Sycamore, De Kalb county: mean temperature, $10^{\circ}.2$, is $6^{\circ}.0$ below the January average for the three preceding years.

Riley, McHenry county: mean temperature, $8^{\circ}.8$, is $9^{\circ}.1$ below the January average for the last twenty-two years; in only two years during that period has January been colder, viz: in 1875, and 1883.

Peoria, Peoria county: mean temperature, $16^{\circ}.8$, is $7^{\circ}.6$ below the January average for the last thirty years. The normal temperature during the same period for the first, second, and third decades of the month are $22^{\circ}.6$, $24^{\circ}.5$, and $25^{\circ}.9$, respectively.

Indiana.—Vevay, Switzerland county: mean temperature, $26^{\circ}.7$, is $4^{\circ}.7$ below the January average for the last twenty years.

Logansport, Cass county: mean temperature, $18^{\circ}.6$, is $6^{\circ}.8$ below the January average for the last twenty-six years.

Wabash, Wabash county: mean temperature, $19^{\circ}.0$, is $5^{\circ}.7$ below the January average for the last nine years.

Spiceland, Henry county: mean temperature, $19^{\circ}.9$, is about 7° below the January average for the last thirteen years.

Kansas.—Lawrence, Douglas county: mean temperature, $18^{\circ}.7$, is $7^{\circ}.9$ below the January average for the last seventeen years.

Independence, Montgomery county: mean temperature, $20^{\circ}.0$, is $8^{\circ}.5$ below the January average for the last thirteen years, and is the lowest January mean for that period.

Atchison, Atchison county: mean temperature, $16^{\circ}.2$, is, with the exception of that for January, 1875, the lowest recorded during the last twenty-one years.

Wellington, Sumner county: mean temperature, $18^{\circ}.9$ is the lowest monthly mean on the observer's record, which begins with January, 1879.

Maine.—Gardiner, Kennebec county: mean temperature, $19^{\circ}.2$, is $1^{\circ}.4$ above the January average for the last forty nine years.

Maryland.—Fallston, Harford county: mean temperature, $29^{\circ}.5$, is $0^{\circ}.5$ below the January average for the last fourteen years.

Cumberland.—Allegheny county: mean temperature, $29^{\circ}.0$, is $1^{\circ}.8$ below the January average for the last twelve years.

Massachusetts.—Worcester, Worcester county: mean temperature, $22^{\circ}.9$, is $1^{\circ}.8$ below the January normal for nearly half a century. The highest January mean for that period, $36^{\circ}.8$, occurred in 1880; and the lowest, $15^{\circ}.9$, occurred in 1859.

Missouri.—Saint Louis: mean temperature, $22^{\circ}.5$, is 9° below the January normal.

Nebraska.—Beaver Creek, Buffalo county: the average noon temperature is 18° , or $9^{\circ}.2$ below the normal noon temperature for the last six years.

New Hampshire.—Contoocook, Merrimack county: mean temperature, $21^{\circ}.2$, is about 1° above the January normal.

New Jersey.—South Orange, Essex county: mean temperature, $28^{\circ}.8$, is $0^{\circ}.6$ above the January average for the last fifteen years.

New Mexico.—Puerto de Luna, San Miguel county: old settlers report that the winter of 1884-5, to January 31st, has been the coldest experienced for many years. The minimum temperature of January, 1885, is -12° , or 14° below that for January, 1884.

New York.—Palermo, Oswego county: mean temperature, $17^{\circ}.7$, is $4^{\circ}.1$ below the January average for the last thirty-two years.

North Volney, Oswego county: mean temperature, $19^{\circ}.7$, is $2^{\circ}.2$ below the January average for the last seventeen years.

Ohio.—College Hill, Hamilton county: mean temperature, $20^{\circ}.9$, is $10^{\circ}.6$ below the January average for the last seven years.

Wauseon, Fulton county: mean temperature, $15^{\circ}.6$, is $7^{\circ}.8$ below the January average for the last fifteen years; the mean temperature for the first half of the month was $25^{\circ}.5$, and for the second half it was $4^{\circ}.7$.

Pennsylvania.—Dyberry, Wayne county: mean temperature, $21^{\circ}.2$, is $0^{\circ}.2$ above the January average for the last twenty-one years.

Virginia.—Variety Mills, Nelson county: mean temperature, $33^{\circ}.6$, is $1^{\circ}.3$ below the January average for the last eight years.

Wytheville, Wythe county: mean temperature, $33^{\circ}.0$, is $2^{\circ}.1$ below the January average for a period of twenty years.

Vermont.—Woodstock, Windsor county: mean temperature, $15^{\circ}.6$, is $0^{\circ}.7$ above the January average for the last eighteen years.

West Virginia.—Helvetia, Randolph county: mean temperature, $30^{\circ}.7$, is $2^{\circ}.1$ below the January average for the last nine years.

LOW TEMPERATURES.

Poplar River, Montana: on the morning of the 1st, a minimum temperature of $-63^{\circ}.1$ occurred, which is the lowest ever recorded in the United States.

Huron, Dakota: the minimum temperature on the 1st, was -33° , the daily mean being $-24^{\circ}.9$; on the 2d, the minimum temperature was $-32^{\circ}.8$.

West Las Animas, Colorado: the minimum temperature on the 1st, $-25^{\circ}.9$, was the lowest recorded since the establishment of this station in February, 1882.

Saint Paul, Minnesota: on the morning of the 2d the temperature fell to $-35^{\circ}.6$, this being the lowest recorded during the last eleven years, with one exception, viz: -39° on December 25th, 1879.

Duluth, Minnesota: on the 2d the minimum temperature was $-41^{\circ}.2$, which is $3^{\circ}.2$ lower than the lowest previously recorded at this station. Reports from the Northern Pacific junction, twenty miles west, state that the temperature fell to -46° , and at Tower, seventy miles north, a temperature of -48° was recorded. Much suffering was caused by the severe weather, many persons having been frost-bitten.

Table of comparative minimum temperatures for the month of January.

State or Territory.	Minimum for January, 1885, Signal Service.		Minimum since Signal-Service stations were opened—3 to 14 years.			Lowest from any other source.		
	Station.	Tempera- ture.	Station.	Tempera- ture.	Year.	Place.	Tempera- ture.	Year.
Alabama	Montgomery	19.2	Montgomery	0	1884	Huntsville	0	1832, 1836
Do	Mobile	19.9	Mobile	14	1884	Mobile	—9	1873, 1874
Arizona	Prescott	—4.0	Prescott	—17	1884	Fort Canby (old)	—20	1855
Do	Fort Apache	—4.0	Fort Grant	10	1883	Camp Grant	19	—
Arkansas	Fort Smith	2.4	Fort Smith	—5	1884	Fort Smith	2	—
Do	Little Rock	9.6	Little Rock	6	1884	Little Rock	16	—
California	Red Bluff	33.0	Red Bluff	19	1883	Fort Crook	—20	1859
Do	San Francisco	43.0	San Francisco	36	1883	Camp Bidwell	—18	1868
Colorado	Pike's Peak	—29.4	Pike's Peak	—37	1883	Fort Garland	—40	1873
Do	Denver	—10.9	Denver	—29	1875	Fort Lyon	—28	1875
Connecticut	New London	1.0	New London	—14	1873	Colebrook	—25	1801
Do	New Haven	—0.9	New Haven	—14	1873	New Haven	—24	1835
Dakota	Fort Totten	—37.0	Pembina	—53	1877	Fort Randall	—44	1875
Do	Fort Buford	—45.5	Fort Buford	—40	1883	Fort Stevenson	—55	1881
Delaware	Delaware Breakwater	12.1	Delaware Breakwater	—9	1884	Fort Delaware	—5	1866
District of Columbia	Washington City	10.2	Washington City	—14	1884	Washington City	—14	1835
Florida	Pensacola	24.3	Pensacola	16	1884	Fort Barrancas	10	1852
Do	Key West	59.3	Key West	48	1879	Key West	44	1857
Georgia	Atlanta	13.7	Atlanta	—1.3	1884	Atlanta	3	1873
Do	Augusta	22.0	Augusta	14	1884	Savannah	18	1845, 1870
Idaho	Boise City	—7.3	Boise City	7	1878	Fort Hall	—12	1872, 1873
Do	Coeur d'Alene	—22.5	Fort Lapwai	—38	1882	Fort Lapwai	—32	1875
Illinois	Chicago	—12.9	Chicago	—18.5	1884	Chicago	—25	1864
Do	Cairo	—4.0	Cairo	—16	1884	Rock Island Arsenal	—29	1873
Indiana	Indianapolis	—11.3	Indianapolis	—25	1884	Arlington (near)	—25	1879
Indian Territory	Fort Reno	—2.5	Fort Gibson	—12	1881	Fort Gibson	—20	1857
Iowa	Dubuque	—24.5	Dubuque	—26	1883	Dubuque	—29	1864
Do	Des Moines	—20.2	Des Moines	—30	1884	Davenport	—22	—
Kansas	Leavenworth	—10.8	Leavenworth	—29	1873	Fort Leavenworth	—30	1834
Do	Dodge City	—18.2	Dodge City	—20	1873	Fort Riley	—29	1862
Kentucky	Louisville	—5.0	Louisville	—19.5	1884	Newport Barracks	—15	—
Louisiana	Shreveport	13.0	Shreveport	6	1879	Baton Rouge	8	1852
Do	New Orleans	27.7	New Orleans	20	1879	New Orleans	17	1852
Maine	Eastport	—11.0	Eastport	—20	1874	Brunswick	—32	1859
Maryland	Portland	—3.2	Portland	—11.5	1882	Portland	19	—
Massachusetts	Baltimore	10.2	Baltimore	—6	1881	Fort McHenry	—15	1873
Michigan	Boston	—1.7	Boston	—13	1882	Williamstown	—30	1835
Do	Escanaba	—26.1	Escanaba	—28	1873	Fort Brady	—42	1873
Minnesota	Mackinaw City	—34.2	Marquette	—26	1881	Marquette	—31	—
Do	Saint Vincent	—40.0	Saint Vincent	—44	1881, 1882	Fort Ripley	—44	1860
Mississippi	Saint Paul	—35.6	Saint Paul	—33	1884	Saint Paul	—39	1868
Missouri	Vicksburg	19.0	Vicksburg	10	1875, 1884	Fayette	7	1879
Montana	Saint Louis	—9.7	Saint Louis	—16	1875	Saint Louis	—19	1835
Do	Fort Benton	—37.9	Fort Benton	—55	1875	Fort Benton	—58	1875
Nebraska	Helena	—15.5	Virginia City	—44	1875	Fort Ellis	—53	1872
Do	Omaha	—18.4	Omaha	—23	1879	Omaha	—21	1873
Nevada	North Platte	—26.8	North Platte	—27	1881	Fort Niobrara	—35	1881
New Hampshire	Winnemucca	8.9	Winnemucca	—14	1879	Fort Ruby	—23	1864
New Jersey	Mount Washington	—50.0	Mount Washington	—46	1875	Dartmouth College	—34	1848
Do	Barnegat City	8.6	Barnegat City	—10	1875	Paterson	—13	1866
New Mexico	Sandy Hook	6.6	Sandy Hook	—3	1879	Alto	—24	1881
New York	Santa Fé	—3.2	Santa Fé	—13	1882	Fort Union	—25	1881
Do	Albany	—10.5	Albany	—18	1878	Salem	—40	1840
North Carolina	Rochester	—5.3	Rochester	—13	1873	Gouverneur	—38	1835
Do	Charlotte	10.8	Charlotte	11	1879, 1881	Lenoir	—16	1877
Ohio	Kitty Hawk	21.6	Kitty Hawk	11	1879	Fort Johnson	15	—
Do	Columbus	—8.1	Columbus	—20	1879, 1884	Cleveland	—11	—
Oregon	Cincinnati	—8.5	Cincinnati	—10	1879	Cincinnati	—12	—
Do	Portland	17.0	Portland	3	1875	Fort Dalles	—23	1862
Pennsylvania	Roseburg	27.3	Roseburg	12	1883	Camp Harney	—15	—
Do	Philadelphia	5.0	Philadelphia	—5	1875	Philadelphia	—9	1866
Rhode Island	Pittsburg	1.7	Pittsburg	—12	1875	Carlisle Barracks	—28	1873
Do	Block Island	5.5	Newport	3	1879	Providence	—17	1866
South Carolina	Narragansett Pier	0.0	New Shoreham	—4	1882	Fort Adams	—13	—
Tennessee	Charleston	28.0	Charleston	19	1873	Charleston	10	1852
Do	Knoxville	2.7	Knoxville	—16	1884	Clarksville	—10	1879
Texas	Nashville	—2.2	Nashville	—10	1884	Glenwood Cottage	—18	1864
Do	Fort Elliott	—6.0	Fort Elliott	—12	1883	Fort Davis	—15	1873
Utah	Fort Concho	1.6	Fort Concho	—1	1881	Camp Stockton	—13	—
Do	Salt Lake City	4.8	Salt Lake City	—20	1883	Salt Lake City	—20	1864
Vermont	Burlington	—25	Burlington	—25	1882	Conville	—30	1875, 1877
Virginia	Norfolk	19.9	Norfolk	8	1879	Woodstock	—38	1878
Do	Lynchburg	12.0	Lynchburg	—4	1877	Fortress Monroe	2	1857
Washington Territory	Olympia	28.0	Olympia	9	1883	Mount Solon	—18	1881
Do	Spokane Falls	—14.0	Spokane Falls	—28	1883	Fort Colville	—33	1875
West Virginia	Milwaukee	—21.5	Morgantown	—6	1875	Fort Walla Walla	—24	1862
Wisconsin	La Crosse	—25.1	Milwaukee	—21	1873	Helvetia	—14	1877
Do	Cheyenne	—18.6	La Crosse	—43	1873	Milwaukee	—30	1864
Wyoming	Cheyenne	—18.6	Cheyenne	—36	1875	Embarras	—40	1875
						Fort Laramie	—40	1864

Monticello, White county, Indiana: at 7 a. m. on the 22d the thermometer (Green's) showed a temperature of -29.5° , which is the lowest ever recorded at this place.

Mount Washington, New Hampshire: on the morning of the 22d the temperature fell to -50° , which is the lowest ever recorded at this station.

Muscatine, Iowa: on the morning of the 28th the thermometer recorded -34.5° , which is the lowest temperature registered here for twenty-three years.

Dubuque, Iowa: the temperature was below zero all day on 19th and 21st; the work of cutting ice was suspended on ac-

count of the intense cold. On the 22d the minimum temperature was -21.6° ; on the 28th the temperature fell to -22.5° , the lowest of the winter.

FROSTS.

Frosts occurred in the various districts on the following dates:

New England.—1st to 5th, 8th to 31st.

Middle Atlantic states.—1st to 5th, 8th to 11th, 13th, 14th, 15th, 17th to 31st.

South Atlantic states.—2d to 9th, 13th, 14th, 17th to 30th.

Florida peninsula.—Cedar Keys, 17th, 18th; Saint Augustine and Limona, 8th; Archer, 8th, 9th, 18th; Newport, 2d, 3d, 4th, 8th, 9th, 18th, 19th, 27th.

East Gulf states.—2d to 5th, 8th, 9th, 10th, 13th, 17th to 20th, 22d to 30th.

West Gulf states.—1st, 2d, 3d, 7th to 13th, 16th to 22d, 25th to 29th.

Rio Grande valley.—Brownsville, Texas, 1st; Rio Grande City, Texas, 2d, 26th.

Tennessee.—1st to 4th, 10th, 13th, 16th to 30th.

Ohio valley.—1st to 5th, 8th, 9th, 10th, 13th, 14th, 19th to 24th, 26th, 30th, 31st.

Lower lake region.—1st to 5th, 8th, 9th, 10th, 13th, 14th, 20th to 23d, 28th to 31st.

Upper lake region.—1st to 31st.

Extreme northwest.—1st to 31st.

Upper Mississippi valley.—1st to 31st.

Missouri valley.—1st to 31st.

Northern slope.—1st to 7th, 9th to 31st.

Middle slope.—1st to 31st.

Southern slope.—1st, 2d, 6th, 7th, 8th, 12th, 19th, 20th, 25th, 26th, 28th to 31st.

Southern plateau.—1st to 31st.

Middle plateau.—1st, 2d, 3d, 6th to 9th, 12th to 16th, 20th to 31st.

Northern plateau.—9th, 11th to 15th, 18th to 28th, 31st.

North Pacific coast region.—1st, 2d, 8th to 17th, 19th to 28th.

Middle Pacific coast region.—3d, 4th, 11th, 12th, 14th, 15th, 17th to 26th.

South Pacific coast region.—3d to 7th, 13th, 15th to 22d, 24th, 25th, 26th, 30th, 31st.

ICE.

Ice formed in the southern parts of the country as follows:

Arizona.—Wickenburg, 1st, 16th, 24th to 27th, 30th.

California.—Poway, 3d.

Florida.—Jacksonville, 18th.

Georgia.—Milledgeville, 26th, 27th; Athens, 3d; Atlanta, 23d, 24th; Savannah, 3d, 18th.

Louisiana.—New Orleans, 2d, 17th, 18th.

North Carolina.—Lincolnton, 24th; Wilmington, 2d; New River Inlet, 3d, 18th, 19th, 21st, 23d, 27th; Portsmouth, 23d.

Texas.—Galveston; 1st, 2d, 17th; Indianola, 1st, 2d, 16th, 17th, 18th, 21st; Brownsville, 2d, 17th; Rio Grande City, 2d, 16th; Fort Stockton, 1st, 2d.

PRECIPITATION.

[Expressed in inches and hundredths.]

The distribution of rainfall over the United States and Canada, for the month of January, 1885, as determined from reports from more than seven hundred stations, is exhibited on chart iii.

In the extreme northwest, the central Missouri and lower Arkansas valleys, the Rocky mountain districts, and on the Pacific coast, the precipitation has been below the January average. In these districts the deficiencies have been small, except on the Pacific coast, where they ranged from 1.00 in southern California to 3.50 in Oregon and Washington Territory. In the southern slope, West Gulf states, and in all districts east of the Mississippi river, the precipitation has been in excess of the average; in the more northerly of these districts, the departures have been small, but in the Gulf states, central Ohio valley, and in the western portions of Virginia and the Carolinas, they have varied from 2.00 to 7.00, the greatest excess occurring in the Gulf states. In the table of miscellaneous data will be found the monthly rain-falls as reported from the Signal Service stations, with the departures from the normal.

In the following table are shown, for each of the geographical districts, as deduced from Signal Service observations, the average January precipitation for a series of years;

the average for January, 1885, and the departures from the normal.

Average precipitation for January, 1885.

Districts.	Average for Jan. Signal-Service ob- servations.		Comparison of Jan., 1885, with the av- erage for sev- eral years.
	For sev- eral years.	For 1885.	
New England	3.90	4.56	+0.66
Middle Atlantic states	3.93	4.41	+0.48
South Atlantic states	4.90	6.73	+1.77
Florida peninsula	3.64	5.41	+1.77
Eastern Gulf states	5.84	9.15	+3.31
Western Gulf states	3.94	7.13	+3.19
Rio Grande valley	1.68	3.12	+1.44
Tennessee	6.23	7.25	+1.02
Ohio valley	3.45	4.45	+1.00
Lower lake region	2.88	2.72	-0.04
Upper lake region	1.86	2.74	+0.88
Extreme northwest	0.64	0.40	-0.24
Upper Mississippi valley	1.79	2.00	+0.21
Missouri valley	0.69	0.54	-0.15
Northern slope	0.97	0.86	-0.11
Middle slope	0.39	0.33	-0.06
Southern slope	0.67	0.83	+0.16
Southern plateau	0.74	0.13	-0.61
Middle plateau	1.31	1.13	+0.18
Northern plateau	2.84	2.00	-0.84
North Pacific coast region	8.10	4.60	-3.50
Middle Pacific coast region	5.02	2.18	-2.84
South Pacific coast region	1.47	0.47	-1.00
Mount Washington, N. H.	4.74	5.49	+1.35
Pike's Peak, Colo.	1.61	0.60	-1.01

DEVIATIONS FROM AVERAGE PRECIPITATION.

The departures exhibited by reports from the regular Signal Service stations are shown in the table of averages for the several districts and in the table of miscellaneous meteorological data. The following notes in connection with this subject are reported by voluntary observers:

Arkansas.—Lead Hill, Boone county: monthly precipitation, 2.65, is about the January average for the last three years.

Illinois.—Anna, Union county: monthly precipitation, 4.64, is 0.96 in excess of the January average for the last ten years.

Sycamore, DeKalb county: monthly precipitation, 2.66, is 1.27 above the January average for the three preceding years.

Riley, McHenry county: monthly precipitation, 2.32, is 0.52 above the January for the last twenty-four years.

Indiana.—Vevay, Switzerland county: monthly precipitation, 5.45, is 1.40 above the January average for the last twenty years.

Logansport, Cass county: monthly precipitation, 2.01, is 0.05 below the January average for the last twenty-six years.

Wabash, Wabash county: monthly precipitation, 2.68, is 0.91 above the January average for the last nine years.

Spiceland, Henry county: monthly precipitation, 4.00, is 1.10 above the January average for the last twenty-six years.

Kansas.—Lawrence, Douglas county: monthly precipitation, 1.66, is 0.46 above the January average for the last seventeen years.

Wellington, Sumner county: monthly precipitation, 1.20, is 0.56 above the January average for the last seven years.

Independence, Montgomery county: monthly precipitation, 2.12, is 0.53 above the January average for the last thirteen years.

Maine.—Gardiner, Kennebec county: monthly precipitation, 5.26, is 1.94 in excess of the January average for the last forty-nine years.

Maryland.—Fallston, Harford county: monthly precipitation, 4.65, is 1.03 above the January average for the last fourteen years.

Cumberland, Allegheny county: monthly precipitation, 3.80, is 1.76 above the January average for the last twelve years.

Massachusetts.—Worcester, Worcester county: monthly precipitation, 5.01, is 1.24 above the January average for a period of forty-seven years; the monthly snowfall, 16.1 inches, is about one-half inch more than the January average.

Missouri.—Saint Louis: monthly precipitation, 3.56, is 1.39 above the January average.

New Hampshire.—Contoocook, Merrimack county: monthly precipitation, 5.30, is 3.00 above the January average.

New Jersey.—South Orange, Essex county: monthly precipitation is 3.80, the average for January during the last fifteen years being 3.85.

New York.—Palermo, Oswego county: monthly precipitation, 3.40, is 0.20 above the January average for the last thirty-two years.

North Volney, Oswego county: monthly precipitation is 3.15, the average for January for the last thirteen years being 3.17.

Ohio.—Wauseon, Fulton county: monthly precipitation, 3.32, is 1.17 above the January average for the last fifteen years; the monthly snowfall, 22.3 inches, is more than double the January average.

Pennsylvania.—Dyberry, Wayne county: monthly precipitation, 4.52, is 1.58 above the January average for the last sixteen years.

Virginia.—Variety Mills, Nelson county: monthly precipitation, 4.43, is 0.29 above the January average for the last six years.

Wytheville, Wythe county: monthly precipitation, 3.83, is 0.27 in excess of the average for a period of twenty years.

Vermont.—Woodstock, Windsor county: monthly precipitation, 4.42, is 1.30 above the January average for the last sixteen years.

West Virginia.—Helvetia, Randolph county: monthly precipitation, 5.90, is 0.30 above the January average for the last nine years.

SNOW.

The dates on which snow fell in the various districts, are as follows:

New England.—1st, 3d, 4th, 8th, 9th, 13th, 15th, 16th, 17th, 21st, 24th to 31st: Mount Washington, New Hampshire, 1st 7th, 9th to 12th, 14th to 19th, 21st, 24th to 31st.

Middle Atlantic states.—1st, 2d, 4th, 7th, 8th, 10th, 13th, 15th, 16th, 17th, 23d to 28th, 31st.

South Atlantic states.—2d, 3d, 4th, 11th, 14th, 17th, 19th, 20th, 21st, 23d, 25th, 26th.

East Gulf states.—Birmingham, Alabama, 17th; Pensacola, Florida, 23d.

West Gulf states.—Palestine, Texas, 16th, 19th, 20th; Shreveport, Louisiana, 16th, 20th; Fort Smith, Arkansas, 3d, 16th; Liberty Hill, Louisiana, 16th, 20th; Cleburne, Texas, 2d, 16th, 20th.

Tennessee.—1st, 3d, 4th, 6th, 16th, 17th, 25th, 27th, 28th.

Ohio valley.—1st, 7th, 13th, 15th, 16th, 17th, 19th, 21st to 31st.

Lower lake region.—1st, 2d, 3d, 7th to 19th, 21st to 31st.

Upper lake region.—1st to 9th, 11th to 31st.

Extreme northwest.—2d, to 8th, 10th, 11th, 13th, 15th, 19th, 20th, 21st, 23d to 31st.

Upper Mississippi valley.—1st, 2d, 5th, 6th, 11th, 12th, 14th to 20th, 22d to 31st.

Missouri valley.—5th, 6th, 11th to 19th, 22d, 23d, 24th, 26th, 27th, 28th.

Northern slope.—1st, 3d, 4th, 5th, 8th, 10th to 19th, 21st, 23d to 29th.

Middle slope.—5th, 11th, 12th, 14th, 15th, 17th, 18th, 19th, 22d, 23d, 24th, 29th.

Southern slope.—2d, 4th, 15th, 16th, 18th to 23d.

Southern plateau.—3d, 4th, 5th, 10th, 14th, 15th, 19th, 23d, 24th, 30th.

Middle plateau.—2d, 3d, 5th, 9th, 10th, 11th, 13th, 14th, 15th, 17th, 18th, 19th, 23d, 24th, 30th.

Northern plateau.—1st, 2d, 3d, 9th, 10th, 11th, 13th, 16th, 17th, 18th, 21st, 29th.

North Pacific coast region.—13th, 16th, 17th.

The following notes relate to the severest snow-storms of the month.

Bozeman, Montana, 2d: reports from the various stock ranges on the 2d stated that the snow in some places was more than two feet deep on the level, and that cattle were starving. In the Yellowstone region the snow was reported to be of great depth.

Fort Canby, Washington Territory, 8th: the weather during the past three weeks has been the severest ever experienced in the Columbia valley and throughout Oregon and Washington Territory; no trains arrived from the east from December 16th until this date.

The observer at Spokane Falls, Washington Territory, reports that the first through train since December 16th arrived on January 8th.

Dubuque, Iowa: trains from the west were delayed by the snow-storm on the 6th; on the 12th no trains arrived in consequence of the heavy snow-fall of the 11th; the severest snow-storm of the season began during the early morning of the 16th and continued without interruption until 9.15 p. m. The drifting of the snow caused delay of east-bound trains from three to eight hours. The Illinois Central railroad was completely blocked with snow beyond Waterloo, and travel was suspended; on the 17th all trains were late.

Davenport, Iowa: snow fell on the 14th, 15th, and 16th; that on the last named date was the heaviest of the season and caused serious interruption to railroad travel; freight trains were discontinued, and passenger trains were run with difficulty; on the 17th all trains were from one to five hours late, and experienced much difficulty in making trips.

Grand Haven, Michigan: all trains which arrived on the 16th were delayed by snow-drifts; the high winds on the 17th caused the snow to drift badly, delaying trains from five to seven hours. Interruption to railroad travel continued on the 18th.

Chicago, Illinois: trains from all points arrived from two to three hours late on the 16th on account of snow-drifts.

Peoria, Peoria county, Illinois: the snow-storm of the 16th was one of the most severe that has occurred for several years, and caused serious interruption to railroad traffic.

Hillsborough, Montgomery county, Illinois: a severe snow-storm prevailed on the 16th; the ground was covered to a depth of nearly two feet; considerable loss of stock was reported.

Quincy, Adams county, Illinois: snow fell to a depth of one foot on the 16th; all trains were delayed from three to eight hours.

Shelbyville, Shelby county, Indiana: a severe snow-storm prevailed on the 15th and 16th, blockading railroads.

Kankakee, Kankakee county, Illinois: snow was two feet deep at this place on the 28th: many trains were detained, being unable to leave on account of obstructed tracks.

Pana, Christian county, Illinois: on the 28th snow was twenty inches deep on the level and in places the drifts covered the fences; all railway trains were delayed and some accidents resulted; much suffering was experienced by live-stock of all kinds.

Poughkeepsie, New York: a heavy snow-storm prevailed in this region on the 28th; the snow drifted badly and caused delay of railway trains.

Pittsburg, Pennsylvania: on the 28th trains from the west arrived from four to seven hours late.

Troy, New York, 28th; more than one foot of snow fell on the 28th, and in many places it drifted to depths of several feet; all trains were late; many were abandoned.

The following is from the "New York Herald" of January 30th, 1885:

PORTLAND, OREGON, January 28th, 1885.—During the past six weeks heavy snow have prevailed throughout eastern Oregon and Washington Territory, and the loss of live stock is reported as very heavy. The latest reports from the settled regions east of the Cascades are that large numbers of persons froze to death during the late cold and protracted snow-storm. A number of persons during the continuance of the storm are known to have wandered off and perished. Most of the bodies of such persons have been recovered since the snow disappeared. It is reported that many persons are still missing, and it is supposed that they have perished.

MONTHLY SNOW-FALLS.

[Expressed in inches and tenths.]

Monthly snow-falls of 3 inches or more were reported from the various states and territories during the month as follows:

California.—Cisco, 23.0; Truckee, 18.0; Emigrant Gap, 14.5; Summit, 14.0; Boca, 10.0.

Colorado.—Pike's Peak, 6.8; West Las Animas, 6.2; Denver, 4.7; Fort Collins, 4.1; Pueblo, 3.5.

Connecticut.—North Colebrook, 15.0; Hartford, 13.0; New London and Norfolk, 9.7; Southington, 9.0; Wallingford, 8.5; Voluntown, 8.0; Bethel, 7.3; Middletown, 7.0; New Haven, 5.9.

Dakota.—Richardton, 12.0; Deadwood, 9.9; Fort Buford, 8.2; Fort Totten, 3.0.

Idaho.—Boisé City, 9.2; Lewiston, 3.9.

Illinois.—Chicago, 20.2; Pana, 20.0; Greenville and Edgington, 19.5; Sandwich, 18.2; Griggsville, 17.6; Wilton Centre, 17.0; Peoria, 16.0; Springfield, 15.6; Sycamore, 15.0; Aurora, 14.8; Riley, 14.7; McLeansborough, 14.5; Mattoon and Mascoutah, 11.9; Anna, 11.6; Rockford, 11.3; Swanwick, 11.0; Marengo, 9.3; Centralia, 8.5.

Indiana.—La Grange, 32.5; Romney, 27.0; Logansport, 25.2; Noblesville, 23.0; Wabash, 22.8; Attica, 22.0; Monticello, 21.0; Fort Wayne, 20.5; Miami, 18.0; Lafayette, 17.3; Crawfordsville and Angola, 15.0; Terre Haute, 14.5; Greencastle, 13.8; Farmland, 11.5; Worthington, 11.0; Indianapolis, 10.4; Richmond, 10.2; Bloomington and Connersville, 10.0; Spiceland, 9.6; Greenfield, 9.0; Columbus and Princeton, 8.0; Knightstown, 7.5; Salem and Washington, 7.2; Sunman, 6.8; Degonia Springs, 6.5; Mauzy, 6.2; Franklin, 6.0; Vevay, 5.1; Marengo, 4.0.

Iowa.—Ottumwa, 27.0; Muscatine, 22.7; West Union, 21.9; Keokuk, 19.6; Oskaloosa, 18.0; Davenport, 16.9; Humboldt, 16.2; Independence, 15.8; Cedar Rapids, 15.0; Des Moines, 13 to 14; Indianola, 13.8; Round Grove, 12.0; Dubuque, 10.9; Cresco, 7.0; Monticello, 5.4.

Kansas.—Fort Scott, 17.8; Wyandotte, 13.2; Holton, 12.2; Independence, 11.8; West Leavenworth, 8.6; Leavenworth, 8.3; Elk Falls, Lawrence, and Maud, 8.0; Wellington, 7.0; Atchison, 6.6; Topeka, 6.0; Clay Center, 5.5; Emporia, 4.5; Allison, 3.1.

Kentucky.—Richmond, 5.0.

Maine.—Orono, 31.0; Portland, 24.5; Gardiner, 22.5; Cornish, 22.0; Waterville, 19.3; Eastport, 8.7.

Maryland.—Cumberland, 4.0; Fallston, 3.0.

Massachusetts.—Rowe, 20.0; Williamstown, 19.0; Lowell, 18.5; Lawrence, 18.0; Worcester, 16.1; Fitchburg, 16.0; Petersham and Leicester, 14.0; Westborough, 12.5; Princeton and Amherst, 12.0; Springfield and Monson, 11.0; Milton, 10.0; Concord, 8.0; Fall River, 7.5; Kingston, 7.0; Taunton, 6.5; Dudley, 5.3; Framingham, 4.0; Boston, 3.9; Providence, 3.7; Somerset, 3.2.

Michigan.—Traverse City, 36.5, Northport, 28.2; Thornville, 27.0; Harrisonville, 26.8; Mottville, 25.0; Hillsdale, 23.0; Grand Haven, 21.7; Swartz Creek, 20.8; Manistique, 20.4; Ionia, 19.6; Alpena, 19.5; Moorestown, 19.0; Ann Arbor, 16.5; Lansing, 14.8; Detroit, 14.0; Escanaba, 10.8; Hudson, 10.1; Mackinaw City, 9.6; Port Huron, 8.6.

Minnesota.—Chester, 10.0; Northfield and Duluth, 5.2; Saint Vincent and Minneapolis, 3.9; Saint Paul, 3.5.

Missouri.—Curryville, 16.5; Saint Louis, 10.5; Independence, Pierce City, and Springfield, 8.0; Conception, 6.0.

Montana.—Fort Shaw, 18.7; Fort Custer, 14.2; Fort Benton, 13.1; Helena, 12.2; Fort Maginnis, 11.8; Fort Assinaboine, 4.1.

Nebraska.—Tecumseh, 13.0; Red Willow and Genoa, 10.0; Harvard, 6.8; De Soto, 6.0; Yutan, 5.0; Omaha, 3.7; Beaver Creek, 3.6; Fremont, 3.3.

Nevada.—Otego, 14.5; Toano and Palisade, 10.0; Wells, 8.5; Winnemucca, 7.8; Tecoma and Battle Mountain, 5.5; Brown's, 5.2; Beowawe and Carlin, 5.0; Elko, Wadsworth and Hot Springs, 4.0.

New Hampshire.—Concord, 21.0; Grafton, 20.0; Contoocook, 19.0; Hanover, 18.5; Mount Washington, 16.2.

New Jersey.—South Orange, 7.0; Paterson, 6.0; Readington, 5.0; Somerville, 4.6; Phillipsburg, 4.5.

New Mexico.—Puerto de Luna, 3.8.

New York.—Auburn, 31.0; Palermo, 29.2; Rochester, 22.2; Menard station (near Albany), 17.4; Albany, 16.8; Buffalo, 16.0; Penn Yan, 15.0; Cooperstown, 14.5; Le Roy, 13.8; Factoryville, 11.5; Oswego, 11.2; Ithaca, 11.0; Mountainville, 10.0; White Plains, 9.0; New York City, 4.6.

North Carolina.—Brevard, 3.2.

Ohio.—Sandusky, 23.2; Wauseon, 22.3; Toledo, 21.2; Garrettsville, 20.0; Ruggles, 17.0; Hiram, 14.5; Tiffin, 13.4; North Lewisburg, 13.0; Cleveland, 11.5; Cincinnati and Westerville, 5.6; Portsmouth, 5.5; College Hill, 5.0.

Pennsylvania.—Erie, 14.4; Wellsboro, 10.8; Blooming Grove, Dyberry, and Easton, 10.0; Chambersburg, 9.0; Leetsdale, 8.2; Catawissa, 8.1; Troy, 8.0; Tamaqua, 7.0; Pittsburg, 6.4; West Chester and South Bethlehem, 5.2; Germantown, 4.2; Haverford, 3.5; Fallsington, 3.4.

Rhode Island.—Providence, 9.5; Pawtucket, 8.2; Nyatt Point, 4.4.

Texas.—Fort Concho, 3.8.

Utah.—Salt Lake City, 13.8; Corinne, 13.5; Nephi, 9.2; Blue Creek, 6.5; Kelton, 5.0; Promontory, 3.2.

Vermont.—Strafford, 32.0; Woodstock, 28.9; Lunenburg, 27.0; Newport, 25.2; Burlington, 22.0; Dorset, 21.5; Charlotte, 14.0.

Washington Territory.—Spokane Falls, 15.6; Dayton, 14.7; Tacoma, 5.5.

West Virginia.—Helvetia, 8.2.

Wisconsin.—Franklin, 32.0; Embarras, 16.2; Madison, 12.7; Sussex, 11.0; Lancaster and Beloit, 10.4; Prairie du Chien, 9.5; La Crosse, 9.1; Wausau, 8.2; Neillsville, 6.2.

DEPTH OF UNMELTED SNOW ON GROUND AT END OF THE MONTH.

[Expressed in inches and tenths.]

Arkansas.—Lead Hill, trace.

Colorado.—Pikes' Peak, 1.0.

Connecticut.—Hartford, 7.5; New London, 3.0; Southington and Bethel, 2.0; New Haven, 1.6.

Dakota.—Vermilion, 12.0; Richardton, 8.0; Fort Buford, 7.5; Fort Totten, 5.0; Deadwood, 4.3; Huron, 2.0; Fort Bennett, 0.3; Yankton, 0.2.

Idaho.—Boisé City, 11.5.

Illinois.—Chicago, 14.8; Springfield and Wilton Centre, 13.0; Aurora, Peoria, Riley, and Sandwick, 12.0; Marengo, Sycamore, and Griggsville, 8.0; Mascoutah, 7.0; McLeansborough and Mattoon, 4.0; Anna, 3.0; Collinsville, 2.5; Swank and Centralia, 2.0.

Indiana.—La Grange, 32.5; Wabash, 16.0; La Fayette, 10.0; Logansport, 8.5; Spiceland, 7.0; Sunman, 2.0; Fort Wayne, 10.

Iowa.—Humboldt, 25.0; Cresco, 20.0; West Union, 18.0; Keokuk, and Muscatine, 15.0; Cedar Rapids, 14.0; Independence, 12.0; Manchester, 10.0; Guttenberg and Indianola, 8.0; Des Moines, 6.8; Monticello and Round Grove, 6.0; Dubuque, 5.0; Davenport, 2.5.

Kansas.—Fort Scott and Elk Falls, 5.0; Wyandotte and Holton, 4.0; Allison, 3.0; Independence, 2.0; Leavenworth, 1.0; Dodge City, Topeka and Wellington, trace.

Maine.—Orono, 28.0; Waterville, 19.3; Portland, 18.0; Gardiner, 17.0; Eastport, 6.0.

Maryland.—Cumberland, 2.0; Baltimore and Woodstock, trace.

Massachusetts.—Deerfield, 15.0; Rowe and Williamstown, 14.0; Amherst, 12.0; Worcester and Leicester, 10.0; Boston, 6.5; Westborough, 6.0; Milton, 5.0; Somerset, 3.0; Taunton, 2.5; Fall River, 2.0; Princeton and New Bedford, 1.0.

Michigan.—Traverse City, 30.0; Manistique, 26.0; Grand Haven, 21.0; Thornville, 20.0; Moorestown, 19.0; Swartz Creek, 18.0; Hillsdale, 16.0; Ionia, 14.0; Ann Arbor, 13.0; Hudson, 12.0; Mackinaw City, 11.0; Port Huron, 6.5; Alpena, Escanaba and Detroit, 6.0; Northport, 3.8.

Minnesota.—Chester, 24.0; Northfield, 12.0; Saint Vincent, 10.0; Duluth, 8.0; Saint Paul, 5.0; Moorhead, 0.5.

Missouri.—Independence, 6.0; Curryville, 5.5; Saint Louis, trace.

Montana.—Fort Maginnis, 6.7; Fort Custer, 3.0; Fort Assinaboine, 1.0; Helena, 0.5.

Nebraska.—Beaver Creek, 10.0; Yutan, 6.0; Tecumseh, 4.0; DeSoto, 3.0; Madison, 2.0; Stockham and Omaha, 0.5; Marquette, trace.

New Hampshire.—Contoocook, 15.0; Mount Washington, 12.0.

New Jersey.—Paterson, 4.0, Somerville, South Orange, and Readington, 1.0; Moorestown, trace.

New Mexico.—Santa Fe, 24.0 on mountains, and 3.0 in valleys.

New York.—Auburn and Palermo, 15.0; Albany, 12.0; Oswego, and Menand station (near Albany) 11.0; Penn Yan, 10.0; Rochester, 9.5; LeRoy and Cooperstown, 8.0; Factoryville, 6.0; Buffalo, 5.0; White Plains and Mountainville, 4.0; Ithaca, 3.0.

North Carolina.—Lincolnton, trace.

Ohio.—Wauseon, 19.0; Toledo, 16.0; Hiram, 12.5; Ruggles, 12.0; Tiffin, 9.0; Garrettsville, 8.0; North Lewisburg, 7.0; New Athens, 5.0; Cleveland, 4.0; Sandusky, 3.0; Westerville, 2.0; Cincinnati and Columbus, trace.

Pennsylvania.—South Bethlehem, 6.5; Troy and Dyberry, 6.0; Wellsboro and Erie, 4.0; Catawissa, 3.0; West Chester, 1.5; Chambersburg, 1.2; Pittsburgh, 1.0; Haverford, 0.8.

Rhode Island.—Point Judith, 1.0.

Utah.—Salt Lake City, trace to 6.0; Nephi, 2.5.

Vermont.—Strafford, 24.0; Woodstock, 18.0; Dorset, 16.0; Charlotte, 12.0; Burlington, 10.0.

Virginia.—Wytheville, trace.

West Virginia.—Helvetia, 0.5.

Washington Territory.—Spokane Falls, 3.0.

Wisconsin.—Embarras, 22.0; Wausau, 18.0; La Crosse, 14.0; Neillsville, 13.0; Lancaster, 11.0; Madison, 9.0; Sussex, 6.0.

SLEET.

Alabama.—Birmingham, 23d.

Arizona.—Fort Bowie, 30th.

Arkansas.—Fort Smith, 15th, 22d, 23d.

Connecticut.—North Colebrook, 16th; New Haven and New London, 28th.

Dakota.—Fort Sully, 5th; Webster, 31st.

District of Columbia.—Washington City, 1st, 15th.

Florida.—Pensacola, 23d.

Georgia.—Milledgeville, 3d, 23d; Athens, 4th; Atlanta, 3d, 23d; Augusta, 23d.

Illinois.—Swanwick, 15th; Cairo, 23d; Mattoon, 30th.

Indiana.—Spiceland, 15th; Greencastle and Indianapolis, 15th, 16th; Laconia, Vevay, Jeffersonville, and Sunman, 16th.

Iowa.—Davenport, 6th, 11th; Independence and Humboldt, 23d.

Kansas.—Salina and Leavenworth, 14th; Topeka, 30th.

Kentucky.—Frankfort, 16th; Louisville, 16th, 23d.

Louisiana.—Point Pleasant, 22d; Shreveport, 19th, 20th; Liberty Hill, 23d.

Maine.—Portland, 1st, 6th, 16th, 17th.

Maryland.—Baltimore, 1st, 4th, 15th, 23d, 24th; Emmitsburg, 15th.

Massachusetts.—Somerset and Boston, 15th, 24th; Thatcher's Island, 24th.

Mississippi.—Vicksburg, 20th.

Missouri.—Saint Louis, 14th, 15th, 16th.

Montana.—Fort Maginnis, 4th.

Nebraska.—Omaha, 5th.

New Hampshire.—Mount Washington, 6th, 17th.

New Jersey.—Little Egg Harbor, Sandy Hook and Atlantic City, 4th; Barnegat City, 23d.

New York.—Oswego, 1st, 7th to 10th, 12th, 25th; Buffalo, 16th; Albany, 16th, 24th; New York City, 24th; Rochester, 25th.

Table of excessive, and greatest monthly precipitation—January, 1885.

Station.	Specially heavy.			Station.	Specially heavy.		
	Date.	Amt.	Amount.		Date.	Amt.	Amount.
<i>Alabama.</i>							
Clintonville	5	3.07	12.32	Pomeroy	15, 16	2.66	6.73
Do	23, 24, 25	7.12	.....	Portsmouth	14, 15, 16	2.97	6.41
Mount Willing	10	3.00	12.05	Marietta	15, 16	3.37	6.22
Do	23, 24	5.50	.....	Cincinnati	15, 16	2.65	.....
Mobile	5	3.32	11.92	New Bremen	11	3.00	.....
Do	23, 24	4.05	.....	Quaker City	15, 16	2.31	.....
Clanton	10	2.14	9.89	Gambier	24, 25	2.14	.....
Do	23, 24	3.35	.....	New Athens	16	2.33	.....
Montgomery	23, 24	5.21	9.72	<i>Ohio.</i>			
Mt. Vernon B'ks	16	3.01	9.58	Pomeroy	15, 16	2.66	6.73
Do	23, 24	4.13	.....	Portsmouth	14, 15, 16	2.97	6.41
Auburn	23	2.98	9.25	Marietta	15, 16	3.37	6.22
Newton	17	3.00	9.00	Cincinnati	15, 16	2.65	.....
Greensburg	14, 15, 16	3.85	8.94	New Bremen	11	3.00	.....
Wetumpka	11	2.75	8.87	Quaker City	15, 16	2.31	.....
Do	23, 24	4.87	.....	Gambier	24, 25	2.14	.....
Marion	23, 24	3.30	8.75	New Athens	16	2.33	.....
Mount View	5	2.00	8.35	<i>Oregon.</i>			
Do	14, 15	3.15	.....	Bandon	4	2.17	6.82
Bolling	23, 24	3.32	8.34	Astoria	3, 4	2.40	6.78
Dadeville	10	2.25	8.33	<i>Pennsylvania.</i>			
Do	23	3.00	.....	Pittsburg	15, 16	2.01	.....
Jacksonville	10	2.12	8.22	<i>South Carolina.</i>			
Do	23, 24	2.09	.....	Aiken	5	2.10	8.16
Tuscaloosa	10	2.50	7.95	Charleston	.....	.....	6.88
Gadsden	16	2.15	7.88	Stateburg	.....	.....	6.04
Do	23, 24	2.00	.....	<i>Tennessee.</i>			
Prattville	10	2.25	7.75	Caryville	15, 16	4.85	10.08
Do	23, 24	3.50	.....	Ridgleton	15, 16	4.54	9.95
Florence	11	2.00	7.41	Grassy Cove	11, 12	2.20	9.90
Edwardsville	16	2.15	7.33	Do	15, 16	2.20	.....
Do	24	2.05	.....	Fostoria	11	2.10	9.46
Greene Springs	14, 15, 16	3.42	7.04	Do	14, 15	5.70	.....
Do	23	2.00	.....	Sunbright	15, 16	3.95	9.25
Tuscumbia	.....	.....	Do	24	2.28	.....
Union Springs	23, 24	2.97	6.89	Somerville	5, 6	3.01	8.85
Centre	.....	.....	Do	14, 15, 16	3.02	.....
<i>Arkansas.</i>							
Little Rock	14, 15	2.13	.....	Milan	5	3.17	7.50
<i>Florida.</i>				Do	15, 16	2.17	.....
Newport	20	2.15	8.21	Beech Grove	15, 16	2.20	7.24
Archer	.....	.....	Trenton	5	2.53	6.98	
Pensacola	23	2.12	8.12	Do	14, 15	2.20	.....
Jacksonville	20, 21	2.33	7.18	Kingston Springs	6	2.10	6.92
<i>Georgia.</i>				McKenzie	6	3.30	6.80
Ellerslie	.....	.....	Dickson	6	2.28	6.76	
Cuthbert	.....	.....	Do	14, 15	2.30	.....
Americus	.....	.....	Memphis	5	2.38	6.61	
Carrollton	.....	.....	Do	14, 15	2.83	.....
Dahlonega	.....	.....	Covington	15	2.10	6.60	
Gainsville	.....	.....	Do	24	2.50	.....
Quitman	.....	.....	McMinnville	15, 16	2.30	6.40	
Fort Valley	.....	.....	Hardison's Mills	.....	.....	6.36	
Thomson	.....	.....	Nashville	15, 16	2.10	6.29	
Atlanta	23, 24	2.91	8.44	Howell	16	2.89	6.23
Milledgeville	4, 5	2.70	8.37	Sailor's Rest	15	2.10	6.23
Do	23, 24, 25	3.74	.....	Hoheuwald	16	2.79	6.18
Columbus	.....	.....	Quarter	8, 9	2.10	.....
Forsyth	5, 6	2.07	7.94	Dresden	5	2.40	.....
Do	16	2.00	.....	Dyersburg	5	2.24	.....
Athens	23, 24	3.15	7.88	Austin	15, 16	2.56	.....
Nashville	.....	.....	<i>Texas.</i>				
Brunswick	.....	.....	Palestine	14, 15	4.75	7.77	
Sandersville	.....	.....	Galveston	15, 16	3.00	6.97	
Augusta	5, 6	2.64	7.55	Indianola	3, 4	2.10	6.40
Do	23, 24	3.07	.....	<i>Vermont.</i>			
Saint Mary's	.....	.....	Dorset	11, 12	2.35	6.26	
Rome	.....	.....	<i>Virginia.</i>				
Savannah	.....	.....	Clarksburg	11	2.37	10.67	
LaGrange	.....	.....	Do	15, 16	4.38	.....
<i>Indiana.</i>			Do	22, 23	3.05	.....
Marengo	.....	.....	Lynchburg	23	6.00	9.77	
Dana	.....	.....	Chincoteague	.....	.....	6.30	
<i>Kentucky.</i>			<i>Washington Ter.</i>				
Richmond	16	2.03	6.54	Neal Bay	3, 4	2.85	17.70
Frankfort	.....	.....	Do	6, 7	6.15	.....
Louisville	15, 16	2.81	6.34	Do	30, 31	3.55	.....
<i>Louisiana.</i>			Pysh	3, 4	4.62	14.31	
Shreveport	14, 15	9.95	12.11	Do	6, 7	4.29	.....
New Orleans	5	2.02	9.70	Do	30, 31	2.70	.....
Do	23, 24	4.01	.....	Bainbridge Isl'd.	3, 4	3.10	10.10
Luling	4, 5	2.45	7.83	Do	5, 6, 7	4.26	.....
Grand Coteau	15, 16	3.00	6.91	Port Angeles	3, 4	3.03	8.14
<i>Massachusetts.</i>			Do	6, 7	3.07	.....
Princeton	6	2.00	8.75	Fort Canby	.....	.....	6.68
Williams	11, 12	3.66	6.03	Olympia	6, 7	2.10	6.23
Thatcher's Island	.....	.....	<i>West Virginia.</i>				
New Bedford	.....	.....	Do	15, 16	2.41	.....
<i>Mississippi.</i>							
Vicksburg	15, 16	3.69	7.69	Do	15, 16	2.41	.....
<i>North Carolina.</i>							
Brevard	4, 5, 6	2.80	12.90	Do	15, 16	2.41	.....
Do	11, 12	2.80	.....	Do	15, 16	2.41	.....
Do	23, 24	2.45	.....	Do	15, 16	2.41	.....
Highlands	15, 16	3.00	9.65	Do	15, 16	2.41	.....
Kiley's, n. e. r.	.....	.....	Do	15, 16	2.41	.....
Raleigh	.....	.....	Do	15, 16	2.41	.....
Charlotte	.....	.....	Do	15, 16	2.41	.....
Hatteras	.....					

North Carolina.—Wilmington, Smithville, New River Inlet and Fort Macon, 19th; Charlotte and Asheville, 23d; Statesville, 4th, 20th, 23d, 24th; Weldon, 22d, 23d, 24th.

Ohio.—North Lewisburg, 15th; Hiram, 15th, 16th; Westerville, Ruggles, Toledo, College Hill and Jacksonburg, 16th; Cincinnati, 16th, 23d.

Pennsylvania.—Fallsington, 4th; Leetsdale, 11th; Chambersburg and Pittsburg, 23d; Erie, 16th; Philadelphia and Dyberry, 24th.

Rhode Island.—Point Judith, 19th, 20th; Narragansett Pier and Block Island, 28th.

South Carolina.—Stateburg, 18th.

Tennessee.—Nashville, 5th, 23d; Memphis, 16th; Chattanooga, 20th, 23d.

Texas.—Fort Concho, 15th, 21st, 22d; Cleburne, 2d, 15th, 22d; Austin, 20th; Indianola, 16th; Palestine, 20th, 30th; Brownsville, 1st; Fort Stockton, 15th, 20th, 22d; Fort Davis, 22d; El Paso, 15th.

Virginia.—Variety Mills, 1st; Marion, 23d; Blacksburg, 21st; Lynchburg, 23d; Fort Myer, 1st, 28th.

Wisconsin.—La Crosse, 5th.

HAIL.

Hail is reported to have fallen in the following states and territories:

Alabama.—Birmingham and Greensboro, 27th.

Delaware.—Delaware Breakwater, 1st.

Illinois.—Swanwick, 11th.

Indiana.—Spiceland, 11th; Vevay, 16th.

Iowa.—Guttenberg, 24th.

Kansas.—Leavenworth, 4th, 7th, 8th; Wyandotte, 14th.

Kentucky.—Richmond, 7th.

Louisiana.—Liberty Hill, 16th, 30th; Point Pleasant, 27th.

Maine.—Portland, 16th; Cornish, 17th.

Massachusetts.—Somerset, 15th, 16th, 28th; Westborough, 16th, 24th; Williamstown and Worcester, 12th; Taunton, 1st.

Montana.—Fort Ellis, 7th.

Nevada.—Fort McDermitt, 11th.

New Jersey.—Atlantic City and Moorestown, 4th.

New York.—Le Roy and Factoryville, 16th.

North Carolina.—Chapel Hill 23d.

Ohio.—Sandusky, 16th; Jacksonburg, 30th.

Oregon.—Portland, 1st, 16th.

Tennessee.—Milan, 11th; Austin, 12th; Nashville, 12th, 16th, 23d, 25th.

Texas.—Fort Davis and El Paso, 15th; Austin, 29th; Cleburne, 2d, 4th, 15th, 22d.

Utah.—Nephi, 11th.

Virginia.—Fort Myer, 12th; Dale Enterprise, 15th.

Wisconsin.—Embarrows, 31st.

PRECIPITATION FROM CLOUDLESS SKY.

Fort Myer, Virginia, 7th, at 7.15 p. m., when about four-tenths of the sky were covered with clouds, which were along the horizon, there was a light sprinkle of rain, the sky overhead, from which the rain seemed to fall, being perfectly clear.

Detroit, Michigan, 12th, at 7.15 p. m., the sky was clear except a heavy bank of clouds on the northwestern horizon; from that hour until 8.20 p. m., light snow fell in the outskirts of the city to a depth of two-tenths of an inch; the sky during the time above mentioned was of a hazy appearance.

Leetsdale, Pennsylvania, 19th, at 6.20 p. m., snow fell from a cloudless sky for about three minutes; the flakes were small.

Cincinnati, Ohio, 22d, fine snow fell from a cloudless sky from 8.32 to 8.55 a. m.; the quantity was insufficient to whiten the ground.

Sussex, Waukesha county, Wisconsin: on the 20th, snow fell when no clouds were visible at a greater altitude than 10° above the horizon.

WINDS.

The most frequent directions of the wind during January, 1885, are shown on chart ii. by arrows flying with the wind.

In the northern districts east of the Rocky mountains they were from southwest to northwest, except in the lower Missouri valley, where they were southerly; in Tennessee, the south Atlantic and Gulf states they were from north to east; at the Rocky mountain stations and on the Pacific coast they were variable.

HIGH WINDS.

(In miles per hour.)

During the month of January high winds were reported as follows:

On the summit of Mount Washington, New Hampshire, the wind reached a velocity of fifty miles per hour daily, with the exception of the 16th, on which date the maximum velocity was forty miles from the southeast. Velocities exceeding one hundred miles per hour were as follows: 100, nw., 10th; 110, s., 12th; 102, w., 17th; 101, w., 18th; 110, nw., 22d; 116, nw., 28th; 120, nw., 29th.

The total movement for the month was 36,515, the greatest recorded since the establishment of the station in 1870.

Velocities of fifty or more miles per hour were recorded at other stations, as follows:

Pike's Peak, Colorado, 60, ne., 5th; 80, nw., 6th; 84 nw., 7th; 68, w., 8th; 54, w., 9th; 84, w., 10th; 56, nw., 12th; 88, nw., 16th.

Cape Mendocino, California, 58, s., 1st; 54, s., 4th; 92, s., 6th; 84, s., 7th; 58, se., 9th; 56, s., 10th; 62, se., 16th; 56, s., 28th; 56, s., 29th; 56, s. and se., 30th; 72, s., 31st.

Cape May, New Jersey, 52, w., 17th; 60, nw., 22d; 58, nw., 24th; 60, nw., 26th; 62, nw., 28th.

Sandy Hook, New Jersey, 54, nw., 10th; 68, nw., 17th; 58, nw., 28th.

Buffalo, New York, 71, sw., 17th; 53, nw., 26th.

Rochester, New York, 60, sw., 17th.

Fort Macon, North Carolina, 70, sw., 12th.

Fort Canby, Washington Territory, 62, se., 3d.

LOCAL STORMS AND TORNADOES.

Vernon, Lamar county, Alabama: on the 11th a tornado started at a point two miles north of this place; it passed eight miles north of Fayette, Fayette county, and ended near Eldridge, Walker county. The path of the tornado was from one-fourth to one-half mile in width, and its length was about forty miles; it began at about 5 p. m. and moved in a direction slightly north of east; the velocity of the tornado cloud was thirty miles per hour. One person was killed, several were wounded, and many dwellings were destroyed.

Tuskegee, Macon county, Alabama: at 11 p. m., on the 11th, a tornado occurred eleven miles east of this place, and moved east 20° north, its path being 2640 feet wide. One person was killed, and several houses were destroyed.

Brooksville, Blount county, Alabama: a tornado occurred at this place at 7 p. m., on the 11th; it moved east 20° north, passing four miles southwest of Albertville, Marshall county, and ended four miles west of Collinsville, De Kalb county. The width of the tornado's path was from 600 to 3690 feet, and its length thirty-five miles. The velocity of the tornado was thirty miles per hour. Three persons were killed and many wounded; sixteen dwellings and numerous outbuildings were destroyed. The damage to property is estimated at \$100,000.

Eutaw, Greene county, Alabama: at 6.30 p. m. on the 11th a tornado began at a point eight miles south of this place; it moved east 20° north, passing three miles north of Sawyersville, Hale county; the same distance north of Randolph, Bibb county; and ended ten miles south of Calera, Shelby county. The width of the tornado's path was from 900 to 1,320 feet and its length seventy miles. The tornado cloud was funnel-shaped and moved at the rate of fifteen miles per hour. Five persons were killed, and many dwellings and other buildings destroyed.

Mount Olive, Coosa county, Alabama: at 9 p. m. on the 11th a tornado occurred five miles north of this place; it moved east 10° north, its path being 2,640 feet in width and twenty miles

in length. Two persons were killed and several wounded; many dwellings and out-buildings were destroyed, entailing a loss of \$100,000. A tornado also occurred on this date in Randolph county, between Wedowee and Roanoke, killing two persons and destroying many buildings.

Waverly, Clay county, Mississippi: at 5 p. m. on the 11th a tornado occurred five miles north of this place. The cloud is reported to have been balloon-shaped, its path being from six to seven miles in length; some houses were blown down.

Haddock's station, Jones county, Georgia: a tornado occurred three miles north of this place at noon on the 12th; it moved east 25° north for a distance of twelve miles, passing two miles south of Brown's Crossing, Baldwin county, and ending one mile north of Milledgeville, in the same county; its path was from six to nine hundred feet in width. No loss of life occurred, but four persons were wounded; three dwellings and many out-buildings were destroyed.

Herndon, Buck county, Georgia: at 3 a. m. on the 12th, a tornado occurred in the southern part of this county, and moved eastward, the width of the tornado's path being 3000 feet. Four persons were injured, and twenty dwellings and numerous out-buildings were destroyed.

East Liverpool, Columbiana county, Ohio: a violent storm occurred at this place about midnight of the 16-17th, causing great damage. The storm was preceded by a heavy roaring sound resembling that caused by a moving train. Numerous buildings at this place were unroofed or otherwise damaged; considerable damage is also reported from the surrounding country.

Albany, Dougherty county, Georgia: during the night of the 16th-17th, a tornado passed through this county, nine miles east of Albany. Timber, fences and buildings were blown down.

Steubenville, Jefferson county, Ohio: a severe storm prevailed here during the night of the 16-17th. Several buildings were damaged and trees blown down.

Pike's Peak, Colorado: very high wind prevailed on the 16th; the maximum velocity was eighty-eight miles from the northwest; a part of the stable roof was torn off, and carried a distance of one hundred yards; broken planks, etc., were carried down the mountain side for a distance of one-half mile.

The observer on the summit of Mount Washington, New Hampshire, reports the following: the barometer fell rapidly on the 21st, and during the evening, the wind increased to hurricane force, attaining a velocity of ninety-five miles. The hurricane continued during the following day without abatement, a velocity of one hundred and ten miles occurring. On this date the total wind movement was 2,140 miles, which is the largest daily movement ever recorded at this station. From 11 p. m. on the 21st, to 3 p. m. on the 22d, the average hourly velocity was ninety-five miles, and this figure is less than the actual velocity, as frost-work on the anemometer caused it to record a velocity less than the actual movement.

NAVIGATION.

STAGE OF WATER IN RIVERS.

The Missouri river was frozen during the entire month at Leavenworth, Kansas, and to the northward.

The Mississippi river was frozen at Keokuk, Iowa, and to the northward. At Keokuk, the ice moved slightly on the afternoon of the 8th, and during the succeeding twenty-four hours the river rose from 11.6 feet to 14.2 or 0.2 above the danger-line. Observations of the river's height were made at Keokuk from the 8th to 13th; although the river was frozen during that time there was a range of 2.6 feet. At Vicksburg, Mississippi, the highest stage occurred on the 31st, when the water was 1.3 feet above the danger-line.

In the Ohio river, at Pittsburg, the water rose to one foot above the danger line on the 17th, and at Cincinnati, Ohio, it was within four and two-tenths feet of the danger-line, when at its highest stage on the 19th.

The largest ranges of water occurred in the Ohio river at Cincinnati, and in the Cumberland river at Nashville, being 32.5 feet in the former and 33.8 in the latter.

In the following table are shown the danger points in the rivers at the various stations, the highest and lowest depths for January, 1885, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, January, 1885.

[Expressed in feet and tenths.]

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River:</i>						
Shreveport, Louisiana	29 9	16	28 6	1	20 6	8 0
<i>Arkansas:</i>						
Fort Smith, Arkansas	15 0	1	11 5	23, 24	10 8	12 3
Little Rock, Arkansas	23 0	1	23 3	27, 28	8 0	15 3
<i>Missouri:</i>						
Yankton, Dakota*	24 0	.....	.....	.....	.....	.....
Omaha, Nebraska*	18 0	.....	.....	.....	.....	.....
Leavenworth, Kansas*	20 0	.....	.....	.....	.....	.....
<i>Mississippi:</i>						
Saint Paul, Minnesota*	14 6	.....	.....	.....	.....	.....
La Crosse, Wisconsin *	24 0	.....	.....	.....	.....	.....
Dubuque, Iowa*	16 0	.....	.....	.....	.....	.....
Davenport, Iowa*	15 0	.....	.....	.....	.....	.....
Keokuk, Iowa	14 0	9	14 2	8	11 6	2 6
Saint Louis, Missouri	32 0	2	17 5	29	8 8	28 7
Cairo, Illinois	40 0	25, 26	39 0	1	27 0	12 0
Memphis, Tennessee	34 0	28	30 2	1	15 8	14 4
Vicksburg, Mississippi	41 0	31	42 3	1	17 2	25 1
New Orleans, Louisiana†	-3 0	23, 31	-1 7	1	-10 6	8 9
<i>Ohio:</i>						
Pittsburg, Pennsylvania	22 0	17	23 0	31	2 9	20 1
Cincinnati, Ohio	50 0	19	45 8	29	13 3	32 5
Louisville, Kentucky	25 0	20, 21	21 9	4, 5	6 7	15 2
<i>Cumberland:</i>						
Nashville, Tennessee	40 0	21	37 8	5	4 0	33 8
<i>Tennessee:</i>						
Knoxville, Tennessee	33 0	18	26 5	1, 5	3 6	22 9
Chattanooga, Tennessee	33 0	18	26 5	1, 5	3 6	22 9
<i>Monongahela:</i>						
Pittsburg, Pennsylvania	29 0	17	23 0	31	2 9	20 1
<i>Savannah:</i>						
Augusta, Georgia	32 0	26	27 5	4	7 0	20 5
<i>Mobile:</i>						
Mobile, Alabama	31	17 6	1	12 0	5 6	6
<i>Sacramento:</i>						
Red Bluff, California	.....	.....	.....	.....	.....	.....
Sacramento, California	.....	1	23 5	31	17 0	6 5
<i>Willamette:</i>						
Portland, Oregon	9	15 9	27	1 9	14 0	0
<i>Colorado:</i>						
Yuma, Arizona	.....	.....	.....	.....	.....	.....

§ Below bench mark.

* Frozen the entire month.

† Below high-water mark of 1874 and 1883.

‡ Observations from 8th to 13th, although frozen.

ICE IN RIVERS AND HARBORS.

Arkansas river.—Fort Smith, Arkansas: floating ice on 17th, 18th, 19th, 22d; river free from ice on 25th.

Sherlock, Finney county, Kansas: ice was of a thickness sufficient to bear the weight of teams during the latter half of the month.

Casco bay.—Portland, Maine: on the 23d the harbor was filled with floating ice; on the 22d the steamer "Popham," was cut through by the ice and sank on Phipsburg flats.

Chincoteague bay.—Chincoteague, Virginia: the bay froze over on the 23d.

Connecticut river.—Hartford, Connecticut: the river froze over on the 21st and 22d for the third time this winter; on the latter date the river was frozen for a distance of five hundred miles, and within five miles of Long Island sound.

Delaware bay.—Delaware Breakwater, Delaware: on the 23d the harbor was filled with ice which went out at ebb tide.

Detroit river.—Detroit, Michigan: floating ice 2d, 3d, 10th, 11th, 13th, 15th, 19th, 20th, 22d, 24th, 25th.

Grand river.—Grand Haven, Michigan: on the 1st, the river was frozen along the shores and the channel was filled with slush ice; the river was nearly free from ice on the 3d; on the 13th it was partially frozen.

Lansing, Michigan: the river closed on the 15th for the third time this winter.

Grand Traverse bay.—Traverse City, Michigan; the bay froze on the 26th.

Hudson river.—Albany, New York: on the 1st, the ice began to move and formed a dam at Van Wie's point, causing the

water to submerge the docks and Quay street, but little damage resulted; floating ice on 2d; river frozen on 3d.

Lake Huron.—Port Huron, Michigan: on the 19th, the lake was covered with ice as far as the eye could reach.

Lake Michigan.—Traverse City, Michigan: the lake was frozen over as far as the eye could reach on the 28th.

Manistique, Schoolcraft county, Michigan: on the 27th, the ice in the lake extended beyond the range of vision.

Grand Haven, Michigan: the harbor entrance was closed by ice on the 14th, detaining the propellers "Oneida" and "Michigan"; it was also closed on the 20th; on the 21st, the ice was firmly grounded on the bar, and extended lakeward as far as the eye could reach; on the 23d, a large quantity of ice drifted lakeward, but on the 24th, it was again driven into the harbor by the westerly wind; on the 30th and 31st, the harbor was blocked with ice.

Milwaukee, Wisconsin: at the close of January, the ice in the lake was unusually heavy. Navigation between this place and the ports on the opposite side of the lake was suspended during the latter half of the month. The propeller "Oneida" was caught in the ice-fields off Grand Haven on the 20th, and from that date until the close of the month, drifted with the ice, being unable to reach either shore.

Lake Superior.—Duluth, Minnesota: the lake was covered with ice on the 1st; on the 8th, it was clear of ice; on the 13th and 14th, the lake was frozen for a distance of one-half mile from the shore; on the 16th, the ice extended as far as could be seen.

Mississippi river.—Memphis, Tennessee: floating ice on the 6th, 7th, 18th, 23d, 24th.

Cairo, Illinois: navigation was suspended on account of ice on the 2d and 16th. At Keokuk, Iowa, and at all stations to the northward the river was frozen throughout the month; at Keokuk the ice moved slightly between 5 and 6 p. m. on the 8th.

Missouri river.—Leavenworth, Kansas: the river was frozen throughout the month at this place and at all points northward.

Narragansett bay.—Narragansett Pier, Rhode Island: on the 31st large fields of ice passed out of the western entrance of the bay.

New Haven harbor.—New Haven, Connecticut: the harbor froze over on the 23d; on the 29th the ice, moving with the tide, forced two vessels on the beach; on the 30th the harbor was filled with heavy floating ice which caused damage to the West Haven jetty.

New York harbor.—New York city: floating ice, 27th and 29th.

Niagara river.—Buffalo, New York: river frozen throughout the month.

North branch, Susquehanna river.—Catawissa, Pennsylvania: the river closed on the 28th and 29th.

Ohio river.—Pittsburg, Pennsylvania: floating ice from 1st to 9th, 14th, 15th, 16th, 18th to 30th.

Portsmouth, Scioto county, Ohio: the river was full of floating ice from 1st to 6th and 23d to 31st.

Cincinnati, Ohio: floating ice from 26th to 31st; navigation was interrupted on 27th.

Louisville, Kentucky, drift-ice on 1st, 2d, 3d, 5th, 19th, 28th, 29th, 30th; the canal froze over on the 18th.

Oscego river.—Oswego, New York: on the 22d the river was frozen from the lower bridge to the pier; the ice broke up on the 23d; on the 28th the river was again frozen as on the 22d.

Patapsco river.—Baltimore, Maryland: on the 22d, drift-ice obstructed navigation; on the 24th, there was considerable ice in the river and in Chesapeake bay; several vessels were reported fast in the ice twenty miles below the city; the ice was two inches thick from Baltimore to Seven-foot Knoll on the 29th; on the 30th there was heavy ice in the bay and river, and numerous boats were frozen in the ice.

Potomac river.—Washington, District of Columbia: the ice broke up on the 6th, and on the 7th the river was clear of ice; floating ice on 21st; river frozen on 22d, 30th, 31st.

Alexandria, Virginia: navigation was practically closed by ice on the 29th; the steamer "John Gibson" arrived from Washington on this date, having been fourteen hours in making the trip.

Saint Clair river.—Port Huron, Michigan: river blocked with ice on 1st; on 29th the river was frozen.

Sandusky river.—Tiffin, Seneca county, Ohio: the ice broke up during the latter part of December; the river closed again on January 17th; on the 22d the ice was seven inches thick.

Susquehanna river.—Columbia, Lancaster county, Pennsylvania: the river froze over on the 23d for the second time this winter.

Port Deposit, Maryland: on the 23d an ice-dam extended from Garret's island, three miles south of this place for a distance of several miles northward. On the afternoon of the 23d the ice accumulated to a depth of fifteen feet on the opposite side of the river, causing the water to overflow the entire southern portion of the town.

Wilkesbarre, Pennsylvania: during the night of the 1-2d an ice-dam formed near Nanticoke, causing an overflow of the lowlands near the west side of the river. Railroad and other communication between this place and Kingston was entirely cut off. At Havre de Grace, Maryland, on this date, an ice-dam and freshet were apprehended, but the ice passed out without causing damage.

Miscellaneous.—Bangor, Maine: the ice in Kenduskeag creek broke up on the 12th.

New Haven, Connecticut, 28th: the first ice harvested this season on Lake Whitney; ice ten inches thick.

Toledo, Ohio: the ice in Maumee river was eight inches thick on the 21st.

FLOODS.

Jasper, Dubois, county, Indiana: on the 1st the Patoka river reached a high stage, flooding several mills and lumber yards.

Grand Rapids, Michigan: the river reached an unusual height during the night of the 4-5th. An ice-dam formed at Lamont, sixteen miles below here, which caused the river to overflow as far as Ionia, thirty miles north of Grand Rapids. On the 11th the damage caused at Grand Rapids by the overflow was estimated at from \$50,000 to \$150,000.

Vincennes, Indiana: the Wabash river reached a high stage on the 5th. Residents on the low-lands near the river were compelled to move to places of safety. An overflow occurred in White river, flooding the adjacent country for miles; many families in Daviess and Pike counties were compelled to abandon their homes and thousands of saw-logs were swept away.

Shreveport, Louisiana: on the 16th the Red river rose to a height of 28.6 feet, flooding the adjacent low-lands. Planters along the river moved their stock to places of safety. Trains were delayed on account of washouts on the railroads.

Pittsburg, Pennsylvania: the Alleghany river reached a height of twenty-four feet at 10.30 p. m. on the 17th; the track of the Pittsburg and Western railroad was overflowed, causing suspension of travel.

Chattanooga, Tennessee: the heavy rains of the 15th and 16th caused the small streams to overflow the low-lands. Railroad communication was interrupted on all railroads centering here, with the exception of East Tennessee, Virginia and Georgia. A small stream near Woodville, Jackson county, Alabama, overflowed, washing away an embankment on the Memphis and Charleston railroad; for a distance of one mile the track was covered with water to a depth of three feet. A serious washout occurred on the Nashville, Chattanooga and Saint Louis railroad. Washouts also occurred on the Cincinnati Southern railroad.

Huntingdon, Huntingdon county, Pennsylvania: the heavy rains on the 15th and 16th, caused the streams in this section to rise to unusual heights, rendering travel impracticable on account of washouts in the roadways.

Corpus Christi, Nueces county, Texas, 23d: the continuous rains for several days past have flooded this section. Large numbers of sheep have died from the effects of the wet weather.

Houston, Texas, 23d: the continuous rains throughout southern and eastern Texas, during the past few days have caused much damage to live stock and railroads. All streams were much swollen. Travel on the Texas and New Orleans railroad was suspended on account of extensive washouts. Heavy losses in sheep and cattle have been reported in consequence of the severe weather.

Vicksburg, Mississippi, 31st: Captain Sears, U. S. Engineer Corps, arrived on this date from a tour of inspection of the levees south of Memphis, and reported breaks in the Opossum Fork levee, one hundred and fifty miles north of Vicksburg, and in the Long Lake levee, seventeen miles below Helena.

A break three hundred and fifty feet wide also occurred in Disonia levee, in East Carroll parish, Louisiana, which caused the inundation of the Queen and Crescent railway.

HIGH TIDES.

New Haven, Connecticut, 5th.

Eastport, Maine, 15th.

Fort Macon, North Carolina, 2d.

New River Inlet, North Carolina, 2d, 3d, 15th, 16th, 17th.

LOW TIDES.

Delaware Breakwater, Delaware, 30th.

New York City, New York, 18th.

Indianola, Texas, 17th, 18th.

TEMPERATURE OF WATER.

The following table shows the highest and lowest temperatures of water at the several stations; the monthly ranges of water temperature; the average depth at which the observations were made; and the mean temperature of the air:

Temperature of water for January, 1885.

Station.	Temperature at bottom.		Range.	Average depth, feet and tenths.	Mean temperature of the air at station.
	Max.	Min.			
Atlantic City, New Jersey	35.1	34.3	2.8	3 0	32.3
Alpena, Michigan [†]	50.8	38.0	12.8	13 8	45.4
Augusta, Georgia	36.8	32.5	4.3	9 7	34.0
Baltimore, Maryland	43.8	33.5	10.3	7 7	31.5
Block Island, Rhode Island [*]	39.6	28.9	7.7	31 1	27.0
Boston, Massachusetts	47.0	37.9	9.1	17 5	41.7
Buffalo, New York [†]	50.7	50.7	15.0	9 3	56.5
Canby, Fort, Washington Territory	54.1	39.3	14.8	41 0	50.7
Cedar Keys, Florida	38.9	31.8	1.1	7 7	18.3
Charleston, South Carolina	47.5	31.5	26.0	4 1	36.6
Chicago, Illinois [†]	60.6	39.2	21.4	12 2	50.6
Chincoteague, Virginia	33.5	32.1	1.5	19 0	20.7
Cleveland, Ohio [†]	58.0	36.8	21.8	8 0	47.4
Detroit, Michigan [†]	61.4	54.4	7.0	18 0	50.2
Duluth, Minnesota [†]	77.6	67.5	10.1	16 7	71.9
Escanaba, Michigan [†]	56.0	42.3	13.7	7 0	46.0
Galveston, Texas	40.8	35.1	4.7	11 2	39.0
Grand Haven, Michigan [†]	59.0	38.5	8.5	15 7	26.8
Indianola, Texas	61.4	54.4	7.0	18 0	50.2
Jacksonville, Florida	77.6	67.5	10.1	16 7	71.9
Key West, Florida	56.0	42.3	13.7	7 0	46.0
Mackinaw City, Michigan [†]	40.2	35.4	7.8	16 7	42.7
Macon, Fort, North Carolina	61.3	47.9	13.4	17 2	50.7
Marquette, Michigan	36.2	30.1	6.1	10 0	24.3
Mobile, Alabama	41.0	33.4	7.6	55 8	30.3
Milwaukee, Wisconsin [†]	43.8	33.8	10.0	1 8	31.0
New Haven, Connecticut	53.4	49.0	4.4	35 5	50.6
New London, Connecticut	55.3	46.0	9.3	9 7	51.5
New York City	52.0	47.8	4.2	10 5	46.6
Norfolk, Virginia	40.2	35.4	7.8	16 7	42.7
Pensacola, Florida	61.3	47.9	13.4	17 2	50.7
Portland, Maine	36.2	30.1	6.1	10 0	24.3
Portland, Oregon	41.0	33.4	7.6	55 8	30.3
Sandusky, Ohio [†]	57.0	47.9	13.4	17 2	50.7
Sandy Hook, New Jersey	53.4	49.0	4.4	35 5	50.6
San Francisco, California	55.3	46.0	9.3	9 7	51.5
Savannah, Georgia	52.0	47.8	4.2	10 5	46.6
Smithville, North Carolina	52.4	45.1	7.3	16 8	49.2
Wilmington, North Carolina	52.4	45.1	7.3	16 8	49.2

[†] Frozen throughout the month. * Record from 6th to 18th—thermometer broken. [‡] Frozen from 1st to 7th and from 13th to 30th. [§] Frozen on 1st and 2d and from 13th to 31st.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for Jan-

uary, 1885, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 85.99 per cent. The percentages for the four elements are: Weather, 88.34; direction of the wind, 82.86; temperature, 82.91; barometer, 92.26 per cent. By geographical districts, they are: For New England, 87.25; middle Atlantic states, 89.43; south Atlantic states, 86.08; eastern Gulf states, 89.04; western Gulf states, 85.69; lower lake region, 87.86; upper lake region, 85.53; Ohio valley and Tennessee, 85.76; upper Mississippi valley, 84.53; Missouri valley, 80.25; north Pacific coast region, 77.68; middle Pacific coast region, 70.54; south Pacific coast region, 84.82. There were seventeen omissions to predict out of 3,419, or 0.50 per cent. Of the 3,402 predictions that have been made, seventy-seven, or 2.26 per cent., are considered to have entirely failed; one hundred and twenty-eight, or 3.76 per cent., were one-fourth verified; three hundred and fifty-four, or 10.41 per cent., were one-half verified; five hundred and seven, or 14.90 per cent., were three-fourths verified; 2,336, or 68.67 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During January, 1885, two hundred and six cautionary signals were ordered. Of these, one hundred and eighty-five, or 89.81 per cent., were justified by winds of twenty-five miles or more per hour at or within one hundred miles of the station. One hundred and eighty-seven off-shore signals were ordered, of which number one hundred and sixty-nine, or 90.37 per cent., were fully justified, both as to direction and velocity; one hundred and eighty-one, or 96.79 per cent., were justified as to direction; and one hundred and seventy-one, or 91.44 per cent., were justified as to velocity. Three hundred and ninety-three signals of all kinds were ordered, three hundred and fifty-four, or 90.08 per cent., being fully justified. These do not include signals ordered at display stations where the velocity of the wind is only estimated. Of the above cautionary off-shore signals one hundred and nineteen were changed from cautionary. In thirty-six cases winds of twenty-five miles or more per hour were reported for which no signals were ordered.

COLD-WAVE SIGNALS.

During January, 1885, there were two hundred and forty-six cold-wave signals ordered of which number, two hundred and twenty-six, or 91.9 per cent. were justified.

RAILWAY WEATHER SIGNALS.

The following is from the report of the "Ohio Meteorological Bureau," under direction of Prof. T. C. Mendenhall:

The verification of railway signals for the month was as follows: For temperature, 95 per cent.; for state of weather, 89 per cent. The cold-wave signal has been displayed several times during the month, and verified in every case.

The following is from the report of the "Tennessee Weather Service," under direction of Hon. A. J. McWhirter:

The great benefits of the weather service to the people throughout the state, and especially to those engaged in agricultural pursuits, will be more fully realized and appreciated when the system of railway signals shall have been adopted, and it is to be hoped that our legislators will give sufficient aid to the bureau to enable the director to put this excellent system into practical operation at an early day.

The following is from the report of the "Alabama Weather Service," under direction of Prof. P. H. Mell, jr.:

The predictions for the month of January telegraphed by General Hazen, the Chief Signal Officer, were as follows:

Local rains.—1, 4, 5, 11, 14, 20, 23, 31.

General rains.—15, 16, 24, 25, 28.

Fair weather.—2, 3, 6 to 10, 12 to 19, 21, 22, 26, 27, 29, 30.

Lower temperature.—1, 6, 7, 10, 12, 13, 16, 17, 22, 28.

Higher temperature.—2 to 5, 8, 9, 11, 15, 18, 19, 23, 24, 26, 27, 29 to 31.

Stationary temperature.—14, 20, 21.

Cold wave.—1, 10, 12, 15, 22, 27.

The verification of signals for January was 87 per cent. for weather, and 91 per cent. for temperature.

Table of miscellaneous meteorological data for January, 1885—Signal Service observations

Stations.	Elevation above sea-level.	Atmospheric pressure.						Temperature of the air (in degrees Fahrenheit).												Winds.									
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.	Highest barometer Date.	Lowest barometer Date.	Monthly range of barometer.	Monthly mean.	Departure from normal.	Extremes.	Max.	Date.	Mean max.	Min.	Monthly range.	Daily ranges.	Mean rel. humidity.	Mean new-point.	Precipitation.	Departure from normal.	Total move-ment.	Prevailing direc-tion.	Max. velocity.					
<i>New England.</i>																													
Eastport	61	29.88	-10	29.94	30.73	3 28.96	17 1.74	20.3 +0.5	48.0	12 29.3	-11.0	22 12.3	50.0	32.5	10	7.0	19 75.9	13.8	3.80	+0.60	9,267	w.	52	ne.	23 14 10 13 8				
Portland	45	29.94	-09	29.99	30.77	3 29.16	17 1.61	24.3 +0.8	52.3	13 33.5	-3	2.2	26	16.7	55.5	28.4	11	6.2	24 0.9	15.7	3.02	-0.30	7,227	w.	40	ne.	12 10 9 11 11		
Mount Washington	6,279	25.29	29.93	30.43	4 29.24	17 1.15	8	-7-4.7	37.0	7 11.5	-50	0.22	-13	87.0	50.0	17	10.9	8.9	5.95	+1.35	6,515	w.	52	sw.	29 22 12 12 18				
Thatcher's Island	48							26.2			51.7		16.8		3.3	29	19.6	55.0	17	6.35									
Boston	122	29.89	-09	30.03	30.80	3 29.22	17 1.57	27.0 +0.4	60.1	12 30.8	-1	7.2	29	17.9	61.1	8.32	8.11	8.1	2.27	67.0	17.2	5.33	+1.14	10,709	w.	42	s.	12 9 10 12 9	
Point Judith								30.0			55.0		17 35.0		1.5	29	22.1	1.53	5.5		5.09								
Block Island	27	30.04		30.67	30.81	3 29.35	17 1.46	31.5 +1.2	58.8	17 10.8	5.5	23	23.3	33.3	40.0	28	5.0	16	81.5	20.4	5.30	+0.03	10,607	sw.	44	w.	17 11 6 18 7		
Narragansett Pier								34.7			57.0		17 38.7		0.2	29	20.7	5.7			5.72								
New London	47	30.04	-03	30.09	30.84	3 29.33	17 1.51	29.0 +0.2	54.3	17 30.6	1	0.29	21.0	53.3	33.0	7.17	5.8	16	73.7	21.3	5.44	+1.42	6,650	sw.	43	sw.	17 13 7 13 11		
New Haven	107	29.96		30.08	30.82	3 19.26	17 1.56	20.8 -1.1	54.2	12 35.1	-0.9	29	18.5	55.1	13.2	3.17	3.7	16	75.4	19.9	4.05	-0.19	6,544	n.	31	n.	17 12 7 13 11		
<i>Middle Atlantic states.</i>																													
Albany	75	30.00	-07	30.10	30.83	3 29.24	17 1.59	21.7 -1.7	56.8	12 31.2	-10.5	29	21.9	4.7	29.8	17	5.9	16	68.8	8.12	8.09	+0.35	4,832	sw.	28	s.	11 13 12 14 5		
New York City	154	29.92	-06	30.11	30.84	3 29.32	17 1.53	29.2 -0.9	60.0	12 37.6	4	4.9	29	23.3	55.1	13.0	1	4.8	18.2	32.4	4.30	-0.18	10,310	w.	50	w.	17 11 9 12 10		
Sandy Hook	26	30.09	-05	30.12	30.86	3 29.35	17 1.51	31.0 +0.3	63.4	12 39.2	6.6	29	23.5	56.5	30.8	5.17	5.3	31	70.1	12.4	5.48	+0.28	14,932	nw.	68	uw.	17 13 6 16 9		
Barnegat City	23	30.09	-05	30.11	30.84	3 29.37	17 1.50	33.3 +1.7	56.8	14 41.3	6.6	29	25.0	50.2	23.1	6.28	0.7	3.1	31	81.1	12.6	4.34	-0.05	12,191	bw.	52	bw.	17 12 6 16 9	
Little Egg Harbor								31.8			52.5		12 39.5	5.5	2	24	4.0	5.0		4.07									
Atlantic City	13	30.09	-06	30.10	30.84	3 29.44	17 1.38	32.3 -0.3	53.0	12 39.9	7.5	29	24.0	45.5	32.0	17	3.6	31	83.4	27.4	6.27	+0.29	6,413	bw.	38	s.	17 14 5 15 8		
Cape May	27	30.10		30.13	30.82	3 29.40	17 1.42	30.4 +2.2	58.8	9 44.9	13.1	22	28.4	43.7	73.3	20	7.0	19.7	5.30	4.96	+0.00	12,455	sw.	62	sw.	28 12 41 21			
Philadelphia	117	30.00	-05	30.13	30.86	3 29.34	17 1.52	29.9 -1.5	63.8	12 38.2	5.6	29	22.8	52.8	2.32	16	5.8	19.7	8.0	2.92	-0.49	8,555	bw.	52	w.	17 11 8 16 7			
Baltimore	45	30.10	-04	30.10	30.85	3 29.50	10 1.35	34.0 -0.8	65.4	17 42.0	10.2	22	26.8	55.2	42.5	17	7.0	31	0.4	25.2	8.37	-0.11	5,090	sw.	37	sw.	17 11 9 12 10		
Washington City	106	30.04	-04	30.16	30.87	3 29.36	17 1.51	32.7 -0.4	65.9	17 42.6	9.8	29	24.8	56.6	14.5	17	7.3	19	71.1	12.4	4.46	+1.12	5,555	nw.	36	nw.	17 11 8 17 6		
Delaware Breakwater	20	30.13	-03	30.14	30.84	3 29.39	17 1.45	35.3 +3.2	63.0	17 43.2	12.1	3	27.6	50.9	37.9	17	0.9	25	70.2	2.8	3.20	-0.08	13,476	nw.	53	se.	17 12 8 15 8		
Ocean City								34.8			63.7		13 44.8	13.0	22	28.4	47.9	39.0	17	8.1	20.0	77.8	1.60	+1.58	9,495	nw.	48	bw.	17 14 7 13 11
Chincoteague	8	30.14	-03	30.14	30.83	3 29.49	17 1.37	36.6 +3.1	63.7	13 44.8	13.0	22	28.4	47.9	39.0	17	8.1	20.0	77.8	1.60	+1.58	9,495	nw.	48	bw.	17 14 7 13 11			
Cape Henry	16	30.15	-01	30.17	30.81	3 29.53	17 1.28	42.0 +1.3	74.0	15 51.8	18.4	22	33.9	55.6	42.8	17	4.6	47.3	33.1	3.36	-1.75	11,579	n.	47	n.	22 14 10 13 8			
Norfolk	30	30.15	00	30.18	30.78	3 29.59	17 1.19	42.7 +2.3	71.0	16 50.5	19.9	22	34.4	51.1	34.7	17	4.0	19.7	73.8	34.4	-0.01	6,970	w.	37	w.	17 14 11 15 5			
Lynchburg	652	29.44	-03	30.10	30.81	3 29.50	10 1.25	35.4 -1.4	64.9	16 44.3	12.0	22	27.3	54.9	41.1	17	7.4	25.3	73.4	3.77	+5.74	3,415	n.	24	s.	10 12 10 13 8			
Fort Myer	29.87		00	30.17	30.86	3 29.53	16 1.33	31.5 -0.2	66.7	17 42.3	7.0	29	22.9	39.59	7.47	17	7.9	57.0	3.24.2	3.92			nw.	36	nw.	10 11 8 15 8			
<i>South Atlantic states.</i>																													
Kitty Hawk	23	30.17	-01	30.18	30.75	3 29.64	17 1.12	45.4 +3.1	71.9	16 53.4	21.6	39	37.4	50.3	35.9	17	3.1	13	78.9	38.8	5.45	-0.19	12,508	sw.	44	sw.	17 18 12 16 3		
Hatteras	12	30.16	-01	30.16	30.75	3 29.68	7 0.97	47.9 +2.5	70.0	17 55.9	25.7	22	40.0	44.3	33.5	21	5.0	21	81.4	42.0	7.98	+1.48	10,600	ne.	35	w.	17 19 13 12 8		
Fort Macon	11	30.18	+0.2	30.19	30.71	3 29.75	28	0.96	46.0	16 52.8	63.4	17	54.3	22.0	38.5	41.3	40.3	52.3	7.1	2.0	10.80	23.9	9.64	+0.36	12,613	b.	70	sw.	13 18 10 13 8
Wilmington	53	30.13	-01	30.19	30.71	3 29.79	25	0.93	49.2 +1.9	75.5	15 59.0	23.0	34.0	52.4	50.2	32.3	19	9.0	47.0	2.39	5.01	+1.23	5,961	w.	34	nw.	17 17 12 13 8		
Smithville								26.8			65.5		15 53.1	21.3	3	38.9	44.4	23.1	5.5	-0.30	8,561	n.	38	sw.	17 19 14 13 8				
Charlotte	34	30.10	-03	30.20	30.72	3 29.78	28	0.95	46.6 -0.6	65.5	15 53.1	21.3	3	38.9	44.4	23.1	5.5	-0.30	8,561	n.	38	sw.	17 19 14 13 8						
Atlanta	806	29.32	-04	30.22	30.76	3 29.76	16 1.00	40.6 -0.6	71.0	19 40.0	10.9	20	40.6	49.8	32.0	17	4.0	34.2	33.1	3.10	+2.80	4,823	sw.	29	sw.	17 13 11 12 8			
I. 129	29.00	-03	30.23	30.75	3 29.74	16 0.91	39.9 -4.2	64.0	18 48.4	13.7	18	31.6	50.3	35.5	1	9.0	21	66.1	28.4	8.44	+1.29	8,847	n.	37	w.	10 17 10 8 13			
Augusta	183	30.04	-03	30.24	30.73	3 29.71	16 0.92	45.4 -2.3	70.0	16 56.0	20.0	30	3.0	35.4	54.0	38.5	1	8.93	64.3	33.7	7.55	-0.07	3,905	sw.	30	sw.	17 13 5 8 8		
Charleston	52	30.13	-01	30.19	30.74	3 29.64	16 0.80	50.7 +0.1	72.2	16 58.8	28.0	34.4	44.2	44.0	32.1	17	4.71	74.9	42.2	6.88	+2.90	6,385	n.	28	sw.	16 18 11 12 8			
Savannah	87	30.11	-01	30.21	30.70	3 29.67	16 0.73	51.5 -0.5	75.3	15 59.5	29.0	34.2	45.0	47.5	37.7	17	5.19	75.8	40.9	6.45	-0.01	6,603	b.	25	sw.	17 18 11 12 8			
Jacksonville	43	30.13	-00	30.19	30.73	3 29.64	16 0.58	56.2 +0.2	77.7	15 58.6	31.5	31	18.9	49.4	46.1	17	6.39	79.9	49.2	7.18	+3.79	6,336	nw.	29	w.	16 16 15 13 8			
<i>Florida peninsula.</i>																													
Rio Grande City	230	29.98	+0.07	30.23	30.79	17 29.91	15 0.88	51.2 -6.6	80.0	13 60.6	24.2	17	43.2	55.8	34.1	1.27	3.1	8.21	73.6	41.6	2.36	+1.00	3,897	nw.	24	nw.	16 8 12 9 10		
Brownsville	57	30.09	+0.02	30.15	30.71	17 29.84	15 0.87	52.4 -0.4	77.5	11 62.1	27.0	17	45.5	50.5	32.4	1.18	2.87	5.318	n.	36	n.	16 17 11 15 5							
<i>Tennessee.</i>																													
Nashville	549	29.59	+0.01	30.20	30.68	2 29.53	11 1.15	33.1 -5.7	65.3	8 43.3	-2	2.2	22	44.7	53.4	31.1	16	9.0	31	75.4	25.9	6.29	+1.13	6,002	sw.	36	w.	16 13 12 14 5	
Memphis	321	29.58	+0.08	30.22	30.69	2 29.50	11 1.19	30.5 -3.5	64.9	11 44.4	2.7	22	2																

Table of miscellaneous meteorological data for January, 1885—Signal Service observations—Continued.

Stations.	Elevation above sea-level.	Atmospheric pressure.						Temperature of the air (in degrees Fahrenheit).												Winds.														
		Mean actual barometer.			Departure from normal.			Extremes.						Mean monthly range of barometer.			Daily ranges.			Mean rel. humidity.			Mean dew-point.			Departure from normal.			Total movement.			Max. velocity.		
		Mean reduced barometer.	Highest barometer.	Lowest barometer.	Date.	Mean monthly range of barometer.	Monthly mean.	Max.	Min.	Mean min.	Monthly range.	Greatest.	Least.	Max.	Min.	Mean min.	Monthly range.	Greatest.	Least.	Max.	Min.	Mean min.	Monthly range.	Greatest.	Least.	Max.	Min.	Mean min.	Direction.	Date.	No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
Extreme northwest.																																		
Fort Buford.	1,930	27.98	-.02	30.21	30.76	18	29.60	7 1.17	0.0	5.1	45.3	7 11.3	-45.5	1 13	90.8	8.21	11.5	31	73.7	-6.3	0.64	-.10	5.599	w.	34	w.	25	10	10	14	2			
Bismarck.	1,054	25.22	...	30.22	30.75	17	29.61	8 1.16	0.2	0.2	39.3	4 9.4	-30.2	1 11	75.5	43.5	22	8.7	30	86.9	-30.	0.31	...	3,990	n.w.	29	n.w.	20	5	5	15	11		
Fort Totten.	28.32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Moorehead.	923	29.08	-.03	30.18	30.77	1	29.52	8 1.25	0.8	2.7	43.3	8 9.9	-34.9	1 12	78.2	23.5	2	10.9	25	72.3	-8.5	0.02	0.02	6.152	n.w.	38	n.	2	2	1	17	13		
Saint Vincent.	804	29.18	-.04	30.16	30.80	1	29.42	8 1.38	9.9	7.1	39.0	4 3.3	-40.0	1 23	58.5	40.3	22	12.2	25	84.1	-14.	0.32	+	0.04	6,871	w.	40	n.	2	6	2	10	19	
Upper Mississippi valley.																																		
Saint Paul.	801	29.21	+.03	30.15	30.69	1	29.52	8 1.17	4.6	8.0	47.0	5 13.9	-35.6	2 5.1	82.6	42.6	2	9.0	26	73.7	-1.3	0.30	-.07	3,424	n.w.	27	s.	10	7	2	13	12		
La Crosse.	725	29.31	+.02	30.15	30.74	2	29.40	6 1.34	8.4	7.9	43.8	8 17.0	-25.1	2 22	0.4	68.9	35.7	22	9.2	0.6	4.9	-1.5	0.81	-.35	6,209	s.	32	n.	11	10	5	13	13	
Dubuque.	665	29.40	...	30.18	30.74	29.27	6 1.47	12.3	7.2	40.8	6 21.1	-22.5	2 28	1.5	69.3	40.0	12	9.9	15	50.3	-4.1	1.80	+	0.37	3,730	s.	20	s.	9	8	9	11	13	
Davenport.	615	29.48	+.03	30.19	30.75	2	29.22	6 1.53	16.9	4.9	50.0	8 25.8	-17.8	2 28	8.4	67.8	30.4	12	7.7	18	71.3	9.1	2.10	+.03	6,738	n.w.	28	s.	10	9	0	12	13	
Des Moines.	849	29.24	+.03	30.21	30.72	1	29.45	5 1.25	11.5	8.6	46.9	8 19.4	-20.2	2 28	2.1	97	1.37	7	29	3.9	18	70.1	3.7	1.00	-.02	4,102	n.	18	n.	9	9	9	11	11
Keokuk.	618	29.50	+.04	30.20	30.73	2	29.34	6 1.40	10.2	8.5	50.9	8 24.7	-13.9	2 28	7.5	64.8	24.5	29	7.6	15	77.3	10.2	2.44	+.04	6,501	n.w.	24	s.	25	10	7	11	12	
Springfield.	644	29.49	...	30.22	30.75	2	29.39	6 1.35	20.3	7.5	53.9	8 28.0	-13.7	2 22	12.0	7.6	34.7	2 29	9.1	18	74.2	3.2	2.81	+.01	6,337	n.w.	26	n.	27	11	8	10	13	
Saint Louis.	583	29.57	-.02	30.22	30.74	2	29.42	6 1.32	25.0	8.4	69.2	8 30.1	-9.7	2 22	10.7	7.8	9.3	30.5	2 29	7.3	19	73.8	18.4	3.20	+.17	8,505	n.w.	40	w.	10	12	8	10	13
Cal.	377	29.82	+.02	30.24	30.75	2	29.44	11 1.31	29.8	5.7	61.0	8 37.9	-4.0	2 22	11.5	0.0	33.0	2 27	4.5	24	75.9	22.8	3.49	-.75	6,321	n.	31	n.w.	9	11	8	11	12	
Missouri valley.																																		
Fort Bennett.	1,015	28.51	...	30.25	30.74	1	29.74	8 1.00	4.9	5.5	49.0	8 16.2	-39.9	1 7.9	88.9	3.8	5.1	12.5	84.7	0.1	0.14	-.07	3,298	n.w.	38	n.w.	25	5	5	15	11			
Yankton.	1,228	28.52	+.03	30.24	30.77	1	29.62	11 1.13	9.0	0.0	49.8	8 17.4	-24.0	2 0.1	73.8	33.0	4	1.6	15	75.4	2.7	1.53	-.05	4,717	n.	32	n.	10	5	3	22	6		
Huron.	1,305	28.69	-.01	30.23	30.77	18	29.70	10 1.07	3.7	6.1	45.7	8 14.0	-35.0	1 6	75.8	7.3	2	7.9	17	6.8	0.44	+.05	5,505	n.w.	27	s.	22	4	5	15	11			
Omaha.	1,113	28.98	+.03	30.24	30.75	1	29.56	11 1.19	12.2	8.5	50.2	8 21.7	-18.4	1 3	3.8	6.6	29.3	2	4.6	10	74.9	5.6	0.41	-.05	6,371	s.	32	n.	9	8	4	13	14	
Leavenworth.	842	29.27	+.03	30.23	30.75	1	29.48	11 1.27	19.0	7.3	55.0	8 29.5	-10.8	1.7	9.4	0.5	8.3	5.25	7	0.0	6.854	15.0	0.47	+.05	4,810	s.	22	s.	10	12	0	13	12	
Northern slope.																																		
Fort Assinabine.	2,710	27.14	-.04	30.18	30.73	18	29.66	7 1.13	12.0	1.5	46.1	8 21.4	-29.5	1 1.5	46.1	7.95	9.42	2	4	5.0	17	6.6	2.1	0.83	-.45	8,782	s.w.	34	s.w.	7	14	13	11	7
Fort Benton.	2,700	27.20	...	30.17	30.73	14	29.62	7 1.11	13.7	0.5	52.1	7 24.9	-37.9	1 0.1	9.0	0.40	24	5.0	2.2	4.7	3.5	0.25	1.25	6,138	s.w.	37	s.w.	7	11	15	12	4		
Fort Shaw.	3,550	20.29	...	30.15	30.70	14	29.73	7 0.95	17.3	0.0	50.0	31 27.3	-25.0	1 7	3.78	0.42	15.9	4.4	30	7.8	4.11	1.5	1.87	+.07	9,264	s.w.	48	s.w.	0	10	12	15	4	
Helena.	4,044	25.79	-.04	30.17	30.50	15	29.77	10 0.9	79.21	0.4	4.9	57.0	8 29.5	-15.5	15	12.7	7.2	5.2	0.24	7.0	17.5	10.8	1.37	1.19	4,444	w.	42	s.w.	7	10	11	10	4	
Fort Custer.	3,040	26.82	+.03	30.20	30.70	14	29.81	7 0.88	14.6	2.8	52.0	7 23.0	-31.7	1 5.1	3.2	83.3	7.43	7	8.8	0.68	1.25	0.504	w.	32	w.	8	12	14	15	15				
Fort Maginnis.	4,340	25.44	...	30.21	30.61	14	29.85	7 0.76	17.8	...	48.1	7 27.3	-27.3	1 5.4	14	8.563	5.34	3.5	5.5	31	3.5	0.18	12,048	w.	52	w.	5	15	10	11	4			
Poplar River.	2,630	27.88	...	30.23	30.75	17	29.63	7 1.15	14.5	4.5	36.9	7 7.0	-3.3	1	16	100	45.5	21	8.0	4.93	8.5	0.81	3.01	3.95	w.	33	n.	11	13	10	10	10		
Deadwood.	4,600	25.26	+.02	30.21	30.54	15	29.56	10 0.69	19.8	3.2	47.0	8 20.5	-20.5	1 5.1	15.5	19	7.6	62.6	5.31	3.5	3.01	0.99	0.07	5,771	s.w.	32	s.w.	8	9	4	14	13		
Cheyenne.	6,089	23.50	+.02	30.17	30.43	10	29.80	11 0.63	23.6	0.8	52.4	10 33.1	-25.9	1 1	18	8.3	8.40	1.1	5.12	12.5	1.04	0.22	0.06	4,723	w.	31	n.	5	4	1	15	15		
North Platte.	2,841	27.10	+.01	30.22	30.50	18	29.66	11 0.98	12.9	7.1	47.0	8 23.5	-26.8	19	2.3	73.8	3.89	4	3	6.154	2.2	0.12	0.48	4,454	w.	34	n.w.	26	5	6	12	15		
Denver.	5,294	24.67	...	30.19	30.47	9	29.78	23 0.68	29.																									

ATMOSPHERIC ELECTRICITY.

AURORAS.

Fort Bridger, Wyoming, 5th: an aurora was visible during the first half of the night. It appeared in the northeast in the form of an arch covering 40° of the horizon and extending upward 30°.

Mount Washington, New Hampshire, 8th: at 7.12 p. m., after the disappearance of a fog, a faint aurora became visible and continued until 10.12 p. m., when the display was obscured by clouds. The auroral light extended over 80° of the northern horizon and to an altitude of 10°.

Eastport, Maine, 8th: an auroral arch of whitish color and of about 30° altitude was observed from 7 p. m. to 3 a. m. of the 9th.

Thatcher's Island, Massachusetts, 8th: auroral bands of yellowish color, having a waving motion, were observed from 8 to 10 p. m.

Portland, Maine, 8th: an aurora, in the form of a band of diffuse light, was observed from 10.30 p. m. until midnight.

Escanaba, Michigan, 8th: an auroral arch of bright yellow color and resting upon a dark segment was observed at 6.35 p. m. At 11.15 p. m. bright beams rose slowly from the centre to the eastern extremity of the arch and extended to within 45° of the zenith. The display continued until the early morning of the 9th. A faint display also occurred on the 17th from 9.35 to 10.20 p. m.

Fort Totten, Dakota, 8th: an aurora was visible from 6.10 to 10.50 p. m.; there were three arches, one above the other, at altitudes of 15°, 25° and 35°, respectively, the central arch being well defined, while the others were indistinct. Displays were also observed on the 17th and 22d; that on the 17th, resembling the one above described.

Fort Buford, Dakota, 8th: an aurora, in the form of an arch of whitish color, was observed from 9 p. m. until midnight; the arch extended from northeast to northwest, and to an altitude of 35°. On the 17th, a display, consisting of a poorly defined arch of 30° altitude, was observed from 9 to 11.30 p. m.

Moorhead, Minnesota, 9th: an aurora was visible in the north from 11 p. m. until midnight.

Saint Vincent, Minnesota, 17th: an aurora was observed from 8.40 to 11 p. m.; when first seen it consisted only of a diffused light; at 9.15 an arch was formed extending over 50° of the horizon and to an altitude of 25°; indistinct streamers extended upward from the arch, beneath which was a clearly-defined dark segment. A faint auroral light was observed in the north from 6.30 a. m. until daylight on the 23d; no arch was visible.

The following stations report auroras, the observers giving the dates only:

4th.—Le Roy, New York.

8th.—Cresco and Humboldt, Iowa; Salina, Kansas; Cornish and Gardiner, Maine; Amherst, Cambridge, and Rowe, Massachusetts; Manistique and Swartz Creek, Michigan; Northfield, Minnesota; Yutan, Nebraska; Burlington, Vermont; Embarras, Madison, Wausau, and Manitowoc, Wisconsin.

14th.—Tiffin and Hiram, Ohio.

15th.—Ann Arbor, Michigan.

17th.—Sussex, Wisconsin.

31st.—Hiram, Ohio.

THUNDER-STORMS.

Thunder-storms occurred in several states and territories during January, as follows:

Alabama.—Montgomery, 11th, 16th; Birmingham, 11th, 27th; Greensboro, 5th, 11th, 27th.

Connecticut.—New Haven, 16th.

Florida.—Cedar Keys, 6th, 16th; Sanford, 16th; Key West, 30th, 31st; Pensacola, 12th, 16th; Archer, 6th, 16th; Tallahassee, 11th, 16th.

Georgia.—Atlanta, 11th, 16th, 27th, 28th; Savannah, 6th, 12th, Augusta, 16th.

Illinois.—Cairo, 5th, 11th; Anna and Swanwick, 11th.

Indiana.—Indianapolis, Laconia, Vevay, Jeffersonville, Sunman and Spiceland, 11th.

Kentucky.—Louisville, 22d; Frankfort, 11th; Richmond, 11th, 15th, 16th.

Louisiana.—New Orleans, 5th, 6th, 16th, 24th; Shreveport, 14th, 15th; Liberty Hill, 5th, 15th; Grand Coteau, 4th, 16th, 31st; Point Pleasant, 5th, 11th, 15th, 30th.

Maine.—Bangor, 16th.

Mississippi.—Vicksburg, 5th, 11th, 16th.

New Jersey.—Moorestown, 12th.

New Mexico.—Santa Fé, 9th.

North Carolina.—Charlotte, 12th; Wilmington and New River Inlet, 28th; Smithville, 12th, 17th; Fort Macon, 6th, 11th, 12th, 28th; Kitty Hawk, 6th, 12th; Hatteras, 6th; Wash Woods, 5th.

Ohio.—Cincinnati and College Hill, 11th; Portsmouth, 12th.

Rhode Island.—Point Judith, 9th, 12th; Block Island, 28th.

South Carolina.—Charleston, 12th; Stateburg, 6th, 12th; Pacolet, 6th, 11th.

Tennessee.—Memphis, 5th, 11th; Nashville, 6th, 11th, 12th, 15th, 16th; Chattanooga and Ashwood, 11th; Milan, 4th, 11th, 15th, 27th; Austin, 12th, 16th.

Texas.—Galveston, 4th, 5th; Indianola, 3d, 4th, 15th; Palestine, 14th, 30th; Brownsville, 13th; Fort Davis, 15th; Fort Brown, 14th; Austin, 3d, 29th; Cleburne, 30th.

Virginia.—Cape Henry, 12th; Norfolk and Johnsontown, 28th.

ELECTRICAL PHENOMENA.

Fort Assinaboine, Montana, 26th: from 7 to 9 p. m. the air was so charged with electricity as to interfere with telegraphic communication.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various states and territories as follows:

Arizona.—27th.

California.—3d, 4th, 8th, 11th, 15th, 16th, 17th, 21st, 26th, 27th, 31st.

Colorado.—2d, 5th, 20th, 30th.

Connecticut.—5th, 11th, 27th, 31st.

Dakota.—2d, 17th, 18th, 20th, 21st, 22d, 31st.

Florida.—2d, 17th, 18th, 22d.

Georgia.—22d, 29th, 30th.

Illinois.—10th, 17th, 18th.

Indiana.—17th, 18th, 19th, 27th.

Iowa.—1st, 12th, 13th, 17th, 18th, 20th, 21st.

Kansas.—1st, 2d, 18th, 21st.

Louisiana.—28th.

Maine.—9th, 14th.

Massachusetts.—2d, 11th, 27th.

Michigan.—1st, 4th, 5th, 8th, 10th, 14th, 17th, 18th, 19th, 22d, 25th.

Minnesota.—2d, 3d, 11th, 18th, 20th, 21st, 26th.

Nebraska.—21st, 27th.

New Hampshire.—9th, 14th.

New York.—4th, 8th, 10th, 14th, 17th, 19th, 20th, 23d.

North Carolina.—7th, 8th, 12th, 13th, 21st, 26th, 28th, 29th.

Ohio.—3d, 10th, 14th, 19th, 21st, 25th, 26th, 28th, 29th.

Oregon.—18th, 19th.

South Carolina.—17th, 18th, 29th, 30th.

Tennessee.—10th, 13th, 20th, 27th.

Texas.—17th, 25th, 29th.

Utah.—1st, 8th, 9th.

Vermont.—21st.

Virginia.—3d, 9th, 14th, 18th, 19th, 21st, 27th, 31st.

Washington Territory.—20th.

Wisconsin.—22d.

Wyoming.—9th, 13th, 22d, 23d, 28th, 31st.

LUNAR HALOS.

Lunar halos were observed in the various states and territories as follows:

Alabama.—28th.

Arizona.—22d, 26th, 27th, 29th, 30th.
Arkansas.—27th.
California.—2d, 4th, 22d, 23d, 25th, 26th to 31st.
Colorado.—23d, 29th.
Connecticut.—1st, 2d, 31st.
Dakota.—1st, 23d to 27th, 29th.
Delaware.—2d, 3d.
District of Columbia.—1st, 3d, 22d, 27th, 28th.
Florida.—2d, 23d, 26th, 27th, 28th.
Georgia.—2d, 22d, 27th, 29th.
Illinois.—2d, 9th, 22d, 23d, 27th, 29th, 31st.
Indiana.—2d, 3d, 4th, 9th, 13th, 20th, 22d, 25th to 29th.
Iowa.—1st, 2d, 3d, 8th, 24th, 25th, 26th, 28th, 29th.
Kansas.—2d, 18th, 20th, 22d, 26th, 27th, 31st.
Kentucky.—20th, 22d, 26th.
Louisiana.—21st, 28th, 29th.
Maine.—1st, 4th, 5th, 23d, 24th, 27th.
Maryland.—27th.
Massachusetts.—3d, 22th, 27th.
Michigan.—1st to 4th, 7th, 8th, 10th, 22d to 27th, 29th, 30th, 31st.
Minnesota.—2d, 20th, 23d, 26th.
Mississippi.—28th.
Missouri.—2d, 25th.
Montana.—1st.
Nebraska.—1st, 2d, 7th, 21st, 23d, 24th, 26th to 31st.
Nevada.—26th, 27th.
New Jersey.—1st, 9th, 11th.
New Mexico.—22d, 28th.
New York.—1st, 3d to 6th, 9th, 11th, 12th, 21st, 23d, 26th to 29th, 31st.
North Carolina.—4th, 8th, 11st, 22d, 27th, 29th, 30th, 31st.
Ohio.—3d, 4th, 5th, 9th, 11th, 19th, 20th, 22d, 25th, 26th, 28th, 29th.
Oregon.—19th, 23d, 26th, 27th, 30th, 31st.
Pennsylvania.—3d, 25th, 26th.
Rhode Island.—3d, 23d.
South Carolina.—22d, 28th, 29th.
Tennessee.—2d to 5th, 21st, 29th.
Texas.—1st, 7th, 21st, 27th, 28th, 29th.
Utah.—1st, 27th.
Virginia.—1st, 4th, 8th, 9th, 22d, 23d, 27th to 31st.
Washington Territory.—24th, 27th.
Wisconsin.—2d, 23d, 24th, 26th, 27th.
Wyoming.—1st, 22d, 24th, 29th.

The phases of the moon during January were: full moon 1st, 12.20 a. m., and 30th, 11.13 a. m.; last quarter 7th, 10.31 p. m.; new moon 16th, 3.30 a. m.; first quarter 23d, 8.20 p. m.; perigee 28th, 8.42 p. m.; apogee 13th, 3.42 a. m.

MIRAGE.

Fort Maginnis, Montana, 1st: the whole country to the southeast appeared elevated above the horizon; the banks of the Missouri river, sixty-five miles distant, appearing with distinctness. On the 12th the entire western and southwestern horizon appeared to be elevated above its natural position and many objects not ordinarily visible were plainly seen.

Saint Vincent, Minnesota, 5th: the "Ridge," eighteen miles east of station, was plainly visible. On the 6th it was also visible, though less distinct. On the 7th a fine mirage was observed from 7.30 to 11.10 a. m., Bathgate and Hamilton, seventeen miles distant, and the "Ridge" being plainly visible. A mirage was also seen on the 28th.

The following stations also report mirage:

Vermilion, Dakota, 5th, 6th, 17th, 19th, 20th, 21st.
Webster, Dakota, 7th, 23d, 29th.
Genoa, Nebraska, 1st, 7th, 19th, 20th.
San Francisco, California, 11th.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul

weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and fifty-eight stations show 4,881 observations to have been made, of which three were reported doubtful; of the remainder, 4,878, there were 4,235, or 86.8 per cent., followed by the expected weather.

SUN SPOTS.

Professor David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for January, 1885:

Date— Jan., 1885	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
2, 10 a. m.	.....	.....	.....	.....	.....	.....	3	7 ⁺	
3, 12 m.	1	15 ⁺	0	0	0	0	4	20 ⁺	
5, 1 p. m.	0	0	0	0	0	0	4	20 ⁺	
7, 12 m.	0	0	1	5 ⁺	0	0	3	10 ⁺	
13, 11 a. m.	.....	.....	.....	.....	.....	.....	1	5 ⁺	
14, 12 m.	0	0	0	0	0	0	1	3 ⁺	
17, 4 p. m.	1	7 ⁺	0	0	0	0	2	10 ⁺	
18, 12 m.	1	35 ⁺	0	0	0	0	2	45 ⁺	
19, 4 p. m.	0	0	0	0	0	0	2	40 ⁺	
21, 2 p. m.	.....	.....	0	0	0	0	6	65 ⁺	
23, 11 a. m.	1	1	0	0	1	1	6	65 ⁺	Many of spots very small.
26, 12 m.	.....	.....	.....	.....	.....	.....	7	45 ⁺	Do.
27, 11 a. m.	0	0	1	5 ⁺	0	0	6	40 ⁺	Do.
29, 5 p. m.	1	2	.....	.....	1	2	5	30 ⁺	Do.
30, 12 m.	0	0	.....	.....	0	0	5	20 ⁺	
31, 12 m.	1	3	0	0	1	3	5	25 ⁺	

Faculae were seen at the time of every observation. ¹Approximated.
 Note.—75th meridian time is used.

EARTHQUAKES.

Professor C. G. Rockwood, jr., of Princeton, New Jersey, has forwarded the following notes on the earthquakes of January, 1885:

2d: At about 2 a. m. a very light shock, lasting five seconds occurred at Laconia, New Hampshire.

2d: At 9.12 p. m. (eastern time) a slight earthquake shock occurred in Frederick county, Maryland, and Loddon county, Virginia, and adjacent districts. It was most severe in the southern part of Frederick county, and affected an oval area whose boundary just includes Boonesborough and Newmarket, Maryland, Washington, District of Columbia, and Warrenton, Virginia. The noise accompanying the shock was compared to that made by a loaded wagon passing rapidly over frozen ground or over a bridge, to distant thunder, and to the roaring of a chimney on fire. The estimates of the duration of the shock as given by observers, were, as usual, very discordant, varying from two seconds to two minutes. As the tendency of ordinary observers is always to exaggerate this element, the unexpected and exciting nature of the phenomena making the time seem longer than it really is, probably ten or fifteen seconds would be a liberal estimate of the duration.

31st: At 5.05 a. m. low rumbling sounds, like distant thunder, followed by a perceptible trembling of the earth, startled residents of the northern towns of Westchester county, New York.

The following communication, published under the heading of "Letters to the editor," is taken from "Science" of January 30, 1885:

Supposing that reasonably exact determinations of the time and character of seismic phenomena are useful, I send the following note on the shock of January 2d at Washington:

I recognized the character of the shock at the instant of its occurrence and timed it. On the following day, comparing my watch with one set to the standard (not local) time adopted for this city, I found the shock occurred at 9 hours 16 minutes p. m., civil time, to which the correction to the Washington meridian is to be applied. My residence is close to Ascension church, on the highest land away from the boundaries of the city; the grade is ninety-two feet above mean level of the river, and two feet higher than the base of the Capitol. I was in the third story back room, facing east into the back yard, and south into an alley. The house is of brick, and above the middle of the second, story is isolated. The shock was a distinct and very heavy and sudden jar, not accompanied by noise, unless by a slight rattling of the windows, and lasted less than a second. The sensation was as if a very heavy body had struck the earth, yet also as if the jar were partly upward rather than downward. There was no second shock within fifteen minutes, although I saw a paragraph in the daily press to the effect that one individual alleges that he felt a second shock about 11 p. m. at Alexandria, Virginia.

W. H. DALL.

The "Philadelphia Record" of January 17th contained the following:

LEBANON, PA., January 16.—Yesterday morning at ten minutes past four o'clock an earthquake shock was distinctly felt at Shaefferstown. The shock

was felt by persons living in different houses, and furniture was jarred and seen to shake.

Mr. S. M. Luther, of Garrettsville, Portage County, Ohio, reports that during the early morning of the 18th a shock, supposed to have been due to an earthquake, occurred at that place. He also states that several persons in the vicinity of Garrettsville noticed the shock. The time at which it occurred was about 5.30 or 5.45 a. m.

The Signal Service observer at San Francisco, California, reports that at 4.33 a. m. (75th meridian time) on the 26th an earthquake shock was felt in the city and vicinity. The duration of the shock was about ten seconds and the vibration was apparently from east to west. A second shock was felt at 11.56 p. m. (75th meridian time) of the same date; it began with a slight tremulous motion which gradually increased in violence and terminated in a quick, sharp shock of three seconds duration. The vibration was apparently from north to south. The shocks were felt as far north as Napa and Petaluma.

San Rafael, Marin county, California, 26th: an earthquake occurred at 1.38 a. m., the vibration being from east to west, and at 8.56 p. m. another shock occurred, vibration from southwest to northeast.

Oakland, California, 26th: at 1.30 a. m. two shocks of earthquake occurred attended by a low rumbling sound; the direction of movement was from northeast to southwest or west. The second shock was a continuation of the first. At 8.56 p. m. on the same date, another shock occurred.

Sacramento, California: at 12.38 a. m. (75th meridian time), on the 31st, an earthquake shock occurred lasting several seconds; the direction of motion was from northeast to southwest.

Captain James Cooper, commanding the ship "Struan," from Panama to San Francisco, reports the following:

We left Panama on October 30th; on November 6th, in latitude N. 4° 17', W. 79° 40' (by account) the officer of the watch noticed a disturbance of the water—as in a tide-rip—close under the stern, and a few seconds later a shock was felt; it seemed as if the ship were bumping heavily on a sand bank, the shock being so severe that all hands came rushing on deck; it lasted about thirty seconds passing from southeast to northwest, and was followed about one minute later by a second shock of about twenty seconds duration, which caused the ship to tremble violently, but without any disturbance of the water.

The disastrous earthquakes which occurred in Spain during the closing days of December, were followed by numerous shocks in January; they are reported to have occurred during the night of the 1-2d, on the 2d, 5th, 12th, and during the night of the 17-18th. The following is from "The Philadelphia Times," of January 31, 1885:

WASHINGTON, January 30.—The consul of the United States at Malaga reports to the Department of State, in regard to the recent earthquakes in Spain, that fifty villages have been destroyed and two thousand lives have been lost. He also says that not less than thirty thousand persons have quitted the city of Malaga, and the rest of the people sleep in the open air. The death rate from disease has increased 300 per cent. At Joyena, a small river which ran through the town has entirely disappeared. At Albañuclos, the earth opened, swallowing the church and other buildings, so that nothing remains in sight but the weather-cock of the church spire. Two hundred bodies have already been taken from the ruins. At Velez Malaga, the prison, churches, convents, and city hall have all been leveled to the ground.

METEORS.

Meteors were observed at the following places during the month:

Sacramento, California, 18th.
Archer, Florida, 15th.
Vevay, Indiana, 13th.
Cedar Rapids, Iowa, 13th, 17th.
Allison, Kansas, 10th, 30th.
Richmond, Kentucky, 3d.
Woodstock, Maryland, 7th, 8th, 10th, 12th, 13th, 17th, 19th.
Rowe, Massachusetts, 13th.
Readington, New Jersey 10th.
Weldon, North Carolina, 11th.
Fort Dodge, Iowa, 20th.
Stateburg, South Carolina, 10th, 12th, 29th.

Strafford, Vermont, 5th.
Marion, Virginia, 7th.
Blacksburg, Virginia, 8th.
Sussex, Wisconsin, 17th.

POLAR BANDS.

Archer, Florida, 2d, 17th, 28th.
Riley, Illinois, 8th, 18th, 19th, 22d.
Guttenberg, Iowa, 2d.
Gardiner, Maine, 4th, 25th.
Amherst, Massachusetts, 19th.
Moorestown, New Jersey, 9th.
Mountainville, New York, 19th, 21st.
Wauseon, Ohio, 3d, 5th, 14th, 18th, 19th, 29th.
Providence, Rhode Island, 13th.
Point Judith, Rhode Island, 19th, 20th.
Stateburg, South Carolina, 17th, 29th.
Nashville, Tennessee, 2d, 3d, 5th.
Rio Grande City, Texas, 6th, 24th, 27th.
El Paso, Texas, 2d, 5th, 12th, 13th, 17th, 20th.
Dale Enterprise, Virginia, 3d, 14th, 18th, 23d.
Wytheville, Virginia, 3d, 14th, 19th, 23d, 29th.
Variety Mills, Virginia, 17th.

WATER-SPOUTS.

The brig "Lilian," H. F. Schive, master, in about N. 17° 52', W. 60° 10', on January 4th, saw a water-spout which remained visible about five minutes.

The s. s. "Nürnberg," A. Jaeger, commanding, in N. 38° 04', W. 71° 00', at 4 p. m. on January 22d, passed a water-spout.

MIGRATION OF BIRDS.

Geese flying southward.—Bismarck, Dakota, 5th; Kitty Hawk, North Carolina, 7th; Roseburg, Oregon, 5th; Austin, Tennessee, 25th; Lynchburg, Virginia, 11th.

Geese flying northward.—Augusta, Georgia, 29th; West Leavenworth, Kansas, 10th; Roseburg, Oregon, 11th.

PRAIRIE FIRE.

Fort Reno, Indian Territory, 2d.

NOTES AND EXTRACTS.

The following extract is from the January, 1885, report of the "Alabama Weather Service," under direction of Prof. P. H. Mell, jr.

January opened the year with most remarkable weather, noted for sudden and great extremes. Five cold waves passed over the state, previously predicted by the Chief Signal Officer with great accuracy. Comparatively few days of the month were mild and pleasant, as there were only three days without rain. The temperature was 5° below the normal, while the rainfall was about 4 inches above the average. Sections of the state suffered severely by the visitation of tornadoes on the afternoon and evening of the 11th. The destruction of life and property was great, and many singular and narrow escapes were made. This cyclonic condition occurred just after the low depression reported by the signal service in Nebraska, and the tornadic influences in Alabama were evidently due to the effort of the atmosphere to restore the equilibrium destroyed by this depression. This tornado was immediately followed by a reduction of temperature of from 15° to 20°.

The month generally has been unfavorable for farm and garden operations; the unusual amount of rainfall, accompanied by so much freezing weather, kept the soil in a condition unfavorable for ploughing or working. The early gardens are consequently very backward; oats are reported killed in some portions of the state.

State summary.

Mean temperature, 42°.8; highest temperature, 76° at Suggsville on the 15th; lowest temperature, 7° at Tuscaloosa on the 22d; range of temperature, 69°; greatest monthly range of temperature, 66° at Clintonville; least monthly range of temperature, 41° at Chattanooga; mean daily range, 11°; greatest daily range of temperature, 41° at Edwardsville on the 17th; least daily range of temperature, 0° at Fayette on the 24th.

Mean depth of rainfall, 8.61 inches; mean daily rainfall, 0.278 inch; greatest depth of monthly rainfall, 12.32 inches at Clintonville; least depth of monthly rainfall, 6.25 inches at Carrollton; greatest daily rainfall, average for the state, 1.28 inches, on the 23d; greatest daily rainfall, 4.07 inches at Clintonville on the 23d.

Days of general rainfall, 5th, 11th, 16th, 23d, 24th; average number of days on which rain fell, 10; average number of cloudy days, 16; average number of fair days, 8; average number of clear days, 7; warmest days, 15th and 16th; coldest days, 2d, 17th, 18th, and 22d.

Meteorological record of voluntary observers and army post surgeons—January, 1885.

Station.	Temperature			Station.	Temperature			Station.	Temperature			Station.	Temperature			Station.		
	Mean.	Maximum.	Minimum.		Mean.	Maximum.	Minimum.		Mean.	Maximum.	Minimum.		Mean.	Maximum.	Minimum.			
Orono, Me.	16.0	53	-22	4.73	Asheville, N. C.	36.0	62	10	4.20	Marietta, Ohio	28.0	59	—	4.22	Dawson, Nebr.	14.0	—	1.31
Cornish, Me.	18.2	46	-13	4.00	Lenoir, N. C.	63	11	4.90	McConnelsville, Ohio	25.1	57	—	5.28	DeWitt, Nebr.	16.9	—	0.50	
Gardiner, Me.	19.2	51	-15	5.26	Brevard, N. C.	38.5	59	11	12.90	Pomeroy, Ohio	29.5	56	0	6.72	Stromsburg, Nebr.	18.4	—	0.50
Waterville, Me.	13.5	43	—	10	Lincolnton, N. C.	35.0	61	14	2.58	Granville, Ohio	22.6	55	—	4.15	Madison, Nebr.	9.6	44	3.50
Contoocook, N. H.	21.2	61	-19	5.30	Highland, N. C.	32.3	53	9	9.05	Lafayette, Ind.	17.6	50	—	3.30	Stockham, Nebr.	24.0	50	0.00
Ashland, N. H.	—	—	—	5.69	Baleigh, N. C.	40.0	69	16	4.00	Fort Wayne, Ind.	17.0	46	—	2.75	West Hill, Nebr.	7.6	—	0.31
Woodstock, N. H.	—	—	—	5.32	Statesville, N. C.	39.0	67	14	5.95	Logansport, Ind.	18.6	51	—	2.01	Caryville, Mo.	9.4	56	0.40
Belmont, N. H.	—	—	—	5.06	Weldon, N. C.	39.5	72	15	4.70	Laconia, Ind.	26.5	60	—	10.50	Independence, Mo.	32.0	50	14.75
Wolfborough, N. H.	—	—	—	4.58	Chapel Hill, N. C.	39.2	77	14	5.24	Terre Haute, Ind.	21.9	49	—	1.31	Greenfield, Mo.	20.3	62	0.50
Lake Village, N. H.	—	—	—	4.58	Stateburg, S. C.	40.0	72	20	6.04	Sunman, Ind.	22.9	49	—	3.69	Pierce City, Mo.	24.3	63	1.30
Charlotte, Vt.	16.8	50	-16	4.30	Aiken, S. C.	46.0	74	19	8.16	Jeffersonville, Ind.	26.9	58	—	5.35	Springfield, Mo.	29.1	62	2.80
Burlington, Vt.	20.8	54	-15	2.36	Pacolet, S. C.	37.6	63	16	—	Spiceland, Ind.	19.9	49	—	4.00	Conception, Mo.	13.1	49	0.53
Woodstock, Vt.	15.6	54	-29	4.42	Milledgeville, Ga.	44.0	71	28	8.37	La Grange, Ind.	17.7	42	—	3.96	Centreville, Mo.	6.3	12	2.14
Dorset, Vt.	19.2	55	-15	6.20	Forsyth, Ga.	44.7	72	19	7.94	Vevay, Ind.	26.7	52	—	5.45	Carthage, Mo.	25.9	60	17
Lunenburg, Vt.	15.4	50	-19	0.70?	Athens, Ga.	39.5	66	16	7.88	Angola, Ind.	15.6	48	—	2.44	Chamois, Mo.	22.3	64	1.40
Newport, Vt.	15.3	50	-21	4.39	Manatee, Fla.	04.1	86	42	4.34	Wabash, Ind.	19.0	48	—	2.68	Warrenton, Mo.	19.9	55	18
Strafford, Vt.	15.7	48	-18	4.40	Archer, Fla.	61.1	81	31	8.18	Monticello, Ind.	15.6	47	—	2.83	Glasgow, Mo.	18.1	54	2.16
Amherst, Mass.	23.5	58	—	8.41	Mayport, Fla.	59.1	81	41	5.86	Attica, Ind.	15.2	46	—	3.00	Harrisonville, Mo.	19.8	59	2.85
Dudley, Mass.	—	—	—	3.86	Tallahassee, Fla.	46.5	71	26	—	Connersville, Ind.	20.9	49	—	3.66	Houston, Mo.	18.0	58	2.50
Mendon, Mass.	23.6	57	—	4	Point Pleasant, La.	42.5	69	19	4.30	Noblesville, Ind.	24.0	55	—	5.56	Pleasant Hill, Mo.	16.8	53	1.60
Milton, Mass.	—	—	—	5.83	Limona, Fla.	60.3	83	33	—	Greenfield, Ind.	18.5	48	—	2.11	Steelville, Mo.	22.5	62	2.66
New Bedford, Mass.	27.5	53	1	3.79	Fort Barrancas, Fla.	52.5	84	20	11.46	Franklin, Ind.	20.8	51	—	3.63	Lexington, Mo.	14.3	49	1.00
Somerset, Mass.	27.2	48	—	4.56	Saint Augustine, Fla.	58.6	79	35	4.86	Fillmore, Ind.	17.4	46	—	3.24	Louisiana, Mo.	16.9	60	2.88
Leicester, Mass.	21.5	55	—	8.40	Green Spring, Ala.	43.2	73	16	7.04	Crawfordsville, Ind.	17.6	55	—	2.60	Mexico, Mo.	18.0	53	2.91
Williamstown, Mass.	22.8	56	-10	6.03	Mt. Vernon B'ks, Ala.	49.9	70	16	9.58	Farmland, Ind.	19.1	47	—	3.90	Miami, Mo.	18.0	53	2.76
Westborough, Mass.	25.9	60	—	8.47	Greensboro, Ala.	39.2	70	20	8.94	Mauzy, Ind.	18.2	45	—	3.69	Portland, Mo.	19.3	58	1.00
Fall River, Mass.	27.4	55	—	2.51	Point Pleasant, La.	42.5	69	19	4.30	Romney, Ind.	16.1	52	—	3.01	Edina, Mo.	18.8	51	1.70
Taunton, Mass.	27.8	58	—	5.50	Liberty Hill, La.	68	—	—	—	Degonia Springs, Ind.	26.0	61	—	5.21	Wauandotte, Mo.	21.5	52	1.31
Deerfield, Mass.	20.8	59	—	15	Luling, La.	70	23	5	7.83	Salem, Ind.	24.7	54	—	1.11	Emporia, Mo.	18.2	57	1.20
Rowe, Mass.	—	17.9	45	12.45	Grand Coteau, La.	51.1	76	21	6.91	Corydon, Ind.	26.0	59	—	8.60	Clay Centre, Mo.	17.3	57	2.75
Worcester, Mass.	22.9	54	—	5.01	Collie, Tex.	34.1	69	12	4.48	Mitchell, Ind.	24.2	50	—	11.38	Perron, Mo.	28.8	73	2.05
Providence, R. I.	30.5	60	—	4.55	Fort Brown, Tex.	53.4	80	29	2.32	Bloomington, Ind.	25.8	52	—	3.48	Atchison, Kans.	16.2	44	1.27
Nayatt Point, R. I.	54	—	—	5.55	Clarksville, Tex.	38.8	68	6	4.11	Tipton, Ind.	18.3	48	—	3.00	Independence, Kans.	20.0	54	2.12
Hartford, Conn.	25.9	59	—	4.02	Fort Concho, Tex.	37.2	74	—	2	Wadsworth, Ind.	21.6	52	—	3.29	Wyandotte, Kans.	21.5	52	1.31
Southington, Conn.	24.5	59	—	4.20	Austin, Tex.	45.0	70	24	5.37	Mattoon, Ill.	25.3	48	—	2.47	Waukegan, Mo.	20.7	52	1.00
North Colebrook, Conn.	20.6	55	—	3.06	Lead Hill, Ark.	28.8	73	5	2.65	Collinsville, Ill.	23.2	54	—	3.70	Waukon, Mo.	14.2	51	1.70
Voluntown, Conn.	53	—	—	4.60	Helvetia, W. Va.	30.7	60	6	5.90	Blue Lick, Ind.	25.0	55	—	11.58	Wauconda, Mo.	18.8	60	18
Mountainville, N. Y.	26.6	60	—	4.39	Austin, Tenn.	34.9	62	6	5.87	Huntington, Ind.	14.0	42	—	2.33	Wauhatchie, Mo.	13.0	40	0.80
Palermo, N. Y.	17.7	46	—	3.41	Ashwood, Tenn.	34.0	66	2	5.00	Princeton, Ind.	24.0	54	—	11.38	Wauhatchie, Mo.	13.0	40	0.80
Auburn, N. Y.	23.0	51	—	5.75	Greenville, Tenn.	37.0	62	14	3.30	Worthington, Ind.	21.6	52	—	3.29	Wauhatchie, Mo.	13.0	40	0.80
South Orange, N. Y.	23.3	51	—	5.75	Maryville, Tenn.	36.0	65	13	7.88	Huntingburg, Ind.	25.3	48	—	5.07	Wauhatchie, Mo.	13.0	40	0.80
White Plains, N. Y.	29.8	60	—	4.53	Andersonville, Tenn.	33.0	59	4	7.68	Decagon Springs, Ind.	26.0	61	—	5.21	Wauhatchie, Mo.	13.0	40	0.80
Fort Niagara, N. Y.	21.0	32	—	3.18	Careyville, Tenn.	33.0	56	3	10.08	Salem, Ind.	24.7	54	—	1.11	Wauhatchie, Mo.	13.0	40	0.80
Fort Columbus, N. Y.	28.9	61	—	5.19	Parksville, Tenn.	37.0	65	12	7.61	Corydon, Ind.	26.0	59	—	8.60	Wauhatchie, Mo.	13.0	40	0.80
West Point, N. Y.	27.9	60	—	10.40	Sunbright, Tenn.	30.0	59	9	9.25	Mitchell, Ind.	24.2	50	—	12	Wauhatchie, Mo.	13.0	40	0.80
Madison Barracks, N. Y.	19.6	52	—	2.30	Ridgeline, Tenn.	32.0	64	5	9.95	Hudson, Mich.	13.9	45	—	2.07	Wauhatchie, Mo.	13.0	40	0.80
Plattsburgh Barracks, N. Y.	16.5	52	—	2.57	Wadsworth, Tenn.	35.0	65	4	7.24	Hilldale, Mich.	13.9	45	—	2.07	Wauhatchie, Mo.	13.0	40	0.80
Fort Hamilton, N. Y.	29.8	56	—	2.24	Foothills, Tenn.	35.0	61	5	8.53	Manistique, Mich.	8.9	45	—	2.47	Wauhatchie, Mo.	13.0	40	0.80
David's Island, N. Y.	31.0	63	—	5.97	Flat Rock, Tenn.	35.0	61	5	8.53	Moorestown, Mich.	11.3	42	—	2.42	Wauhatchie, Mo.	13.0	40	0.80
Phillipsburg, N. J.	29.4	60	—	3.74	Sweet Water, Tenn.	33.0	65	1	5.33	Ann Arbor, Mich.	15.5	44	—	4.64	Wauhatchie, Mo.	13.0	40	0.80
Somerville, N. J.	25.3	58	—	3.09	Grasey Cove, Tenn.	32.0	59	8	9.90	Rockford, Ill.	11.2	44	—	2.39	Wauhatchie, Mo.	13.0	40	0.80
Readington, N. J.	33.7	64	—	7.55	McMinnville, Tenn.	35.0	60	6	6.40	Riley, Ill.	8.8	40	—	2.32	Wauhatchie, Mo.	13.0	40	0.80
Fallington, Pa.	25.8	57	—	5.81	Manchester, Tenn.	33.0	60	3	8.64	Traverse City, Mich.	35.5	41	—	1.11	Wauhatchie, Mo.	13.0	40	0.80
Leedsdale, Pa.	24.8	58	—	7.37	Ridgeline, Tenn.	32.0	64	2	5.42	Hudson, Mich.	13.9	45	—	2.07	Wauhatchie, Mo.	13.0	40	0.80
Grampian Hills, Pa.	17.8	44	—	8.38	Kingston Springs, Tenn.	33.0	64	—	6.92	Hilldale, Mich.	13.9	45	—	2.07	Wauhatchie, Mo.	13.0	40	0.80
Troy, Pa.	21.7	54	—	2.77	Tiffin, Tenn.	34.0	64	3	7.58	Manistique, Mich.	8.9	45	—	2.47	Wauhatchie, Mo.	13.0	40	0.80
Dyberry, Pa.	21.2	52	—	4.52	Dyersburg, Tenn.	31.0	61	3	5.33	Madison, Wis.	7.0	40	—	2.44	Wauhatchie, Mo.	13.0	40	0.80
Blooming Grove, Pa.	52	—	—	1.50	Somerville, Tenn.	35.0	66	3	8.85	Lancaster, Wis.	7.5	40	—	2.30	Wauhatchie, Mo.	13.0	40	0.80
Catawissa, Pa.	30.8	60	—	1.43	Richmond, Ky.	29.5	57	5	6.54	Prairie du Chien, Wis.	7.2	45	—	2.01	W			

Prevailing direction of wind, northwest.

Average number of frosts, 6.

A meteor was seen at Tuscumbia on the 7th, passing through "Taurus" from north to south.

Lunar halos were observed on the 28th at Greensboro "with a radius of 20°," at Birmingham, Marion, Montgomery, Clanton, and Dadeville; on the 21st at Tuscumbia; and on the 20th at Chattanooga.

Thunder storms were general throughout the state on the 11th and 27th. The display of electricity on the 11th was especially remarkable. Tuscumbia and Trinity report thunder storms on the 15th also.

Hail is reported from nearly all stations on the 27th. The storm came up very rapidly from the northwest; it was accompanied by strong winds and considerable electricity.

Tuscumbia reports hail also on the 11th.

Sleet was generally observed on the 23d; at Florence and Tuscumbia on the 16th, and at Birmingham on the 20th.

A slight fall of snow is reported on the 17th by Wetumpka, Birmingham, Tuscumbia, and Trinity; on the 23d by Jacksonville, Centre, and Edwardsville; and on the 25th by Russellville and Trinity.

Florence reports ice eighteen days, Tuscumbia fifteen days, on the 22d it was three and a half inches thick, and it was being gathered to store away for summer; Newton reports ice seven days and Auburn nine days.

Fog was general on the 24th.

The following meteorological summary for January, 1885, has been forwarded by Hon. J. T. Henderson, Commissioner of Agriculture for Georgia:

Districts.	Temperature.			Precipitation.
	Highest.	Lowest.	Mean.	
Northern Georgia.....	64.0	5.0	38.5	9.61
Central Georgia.....	75.0	18.0	44.6	7.85
Southern Georgia.....	77.0	21.0	48.8	8.78
State.....	77	5.0	44.0	8.75

The following meteorological summary for January, 1885, is from the report of Mr. S. D. Fisher, director of the "Illinois Weather Service:"

Districts.	Temperature.			Precipitation.
	Highest.	Lowest.	Mean.	
Northern counties.....	68.0	-26.4	11.9	2.48
Central counties.....	54.0	-21.0	18.4	2.64
Southern counties.....	64.0	-19.0	23.6	2.91
State.....	64.0	-26.4	18.0	2.68

The following meteorological summary and accompanying remarks are from the January, 1885, report of the Indiana Volunteer Weather Service, under direction of W. H. Ragan, of De Pauw University, Greencastle:

Districts.	Temperature.			Precipitation.
	Highest.	Lowest.	Monthly mean.	
Northern counties.....	68	-29	16.7	2.54
Central counties.....	55	-33	19.2	3.74
Southern counties.....	61	-21	24.9	4.77
State.....	61	-33	20.3	3.68

All minimum temperatures occurred on the 22d, in the morning, except Monroe county, 23d.

The mean was from five to ten degrees below the normal at all stations from which reports for several years have been received. Two previous Januaries out of thirteen were colder at Indianapolis, and two out of twenty-two at Logansport. It was warmest at Indianapolis, Logansport, and Romney in 1880, and coldest at the two former in 1875.

The range in mean temperature from year to year is something remarkable, being 25.2 at Indianapolis; 32.5 at Logansport; 11.5 at Mauzy, and 30.9 at Romney.

The precipitation was greater five years at Indianapolis; nine at Logansport; three at Mauzy, and two at Romney; and the snowfall one at Logansport and Romney and two at Mauzy.

The mean temperature and precipitation for December and January combined, during the past three years, were as follows:

	Temp.	Precip.
1882-'3	27.0	2.45
1883-'4	26.9	2.80
1884-'5	24.4	4.79

showing the present season to have been much the coldest of the three, with nearly two inches excess of precipitation.

It is to be regretted that observations have begun so lately that sufficient data are not at hand to make studies of the weather conditions, in connection with the vital and material statistics of our state, of any great value. We expect these observations, when continued through a long series of years, to be of great importance in the discussion of the above subjects.

Ample warning was given of the approach of all cold-waves by the Signal Service. It is greatly to be desired that these warnings should reach all to whom they would be of value.

February, so far, has been unusually cold, and it would be of much interest for those having records covering many years to examine and determine in how many instances a cold December was followed by a cold January or February, etc., and also the bearing of a cold winter on the opening of spring. This office will cheerfully undertake the investigation if furnished the data.

The following meteorological summary and accompanying remarks are from the January, 1885, report of the "Indiana Weather Service," under direction of Professor H. A. Huston, of Purdue University, Lafayette:

Districts.	Temperature.			Precipitation.
	Highest.	Lowest.	Mean.	
Northern counties.....	61.0	-40.0	17.6	2.57
Central counties.....	51.0	-33.0	20.5	3.57
Southern counties.....	61.0	-14.0	25.2	5.71
State.....	61.0	-40.0	21.1	3.95

The mean temperature for the state, 21°.09, is 1°.09 above that for January of last year, 7°.84 below the mean for fourteen years at Indianapolis and 2°.27 below the mean for six years at this station. The mean precipitation for the state, 3.95 inches, is 2.26 above that of last year; 1.12 above the mean for fourteen years at Indianapolis, and 1.48 above the mean of six years at this station. The mean snow-fall for the state, 13.03 inches, is .34 inch below that of last year. The sleet of the 15th was particularly severe at Knightstown and Spiceland. The thunder-storm of the 11th was general throughout the central and southern counties, being very severe at Princeton. A remarkable solar halo was observed at Miami on 21st instant.

The following is an extract of the January, 1885, report of the "Minnesota Weather Service," under direction of Professor Wm. W. Payne, of the Carleton College, Northfield:

A review of the weather for this state for January, 1885, shows the 1st and 2d, to have been very cold, when the maximum weight of the air at the central station for the month was noted at 9 p. m. on the 1st, (barometer 30.69) The minimum temperature of the month was observed at 7 a. m. of the 2d, -40°.9, the lowest reading ever made at this station. Readings of -40° and below throughout the state were generally reported at this date. After 7 a. m. of the 2d, there was a general decline in pressure throughout the state and the northwest in general, with the greatest depression in the British northwest, thus producing a general indraught of warm air from southerly latitudes and the Pacific ocean, producing "Chinook" winds and a thaw in Montana, to the great relief of the cattle interest in that territory, and materially warmer weather in Minnesota. During this mild term the maximum temperatures of the month were generally observed (37°.3 at central station on the 8th, and 47° at Saint Paul on the 5th). The pressure remained below 30.00 inches until the night of the 10-11th, when this body of light air was rapidly displaced by an area of heavy, cold, dry air in the region above named, producing northerly air currents, a high barometer, and a cold term, which lasted, with but slight interruptions, until the 29th, when there was a decrease in pressure and a marked rise in temperature, the month ending with light winds and mild weather.

The precipitation for the month was small, the normal condition for this region during the winter months. It was nearly all in the form of snow and in measurable quantities only on the 5th, 6th, 11th, 16th, 22d, 24th, 29th, and 31st.

The following is the January 1885, report of the "Missouri Weather Service," under direction of Prof. Francis E. Nipher, Saint Louis:

The mean temperature for January, 1885, at the central station, was 22°.5, which is 9° below the normal temperature. The January mean has been still lower only three times since 1837, the lowest being 19°.3 in 1857. The lowest temperature of the month was -12°. The daily minimum was above the freezing point six times during the month, and fell to or below zero seven times. The average temperature of the coldest day of the month was -1°.1, on the 22d, the warmest day, the 8th, having a mean temperature of 54°.

The rainfall was 3.56 inches at the central station, the average for January being 2.17 inches. The snowfall was 10 inches.

In the state, the lowest temperature recorded was -22° at Mexico and Steelville, which is 1° warmer than the coldest temperature observed by Engelmann in Saint Louis in forty-seven years. Kirksville, Houstonia, Louisiana and Oregon report -18° . The highest minimum reported was -4° at Cairo, Ill. The highest maximum reported was 68° at Saint Louis, a temperature often observed in summer. Lexington reports that the temperature fell below 32° on twenty-eight days, and did not rise above 32° on twenty days. It was below zero on thirteen days, and on one day did not rise above zero.

The mean temperature has ranged from $14^{\circ}.3$ at Oregon and Kirksville, to $29^{\circ}.8$ at Cairo.

The rainfall (melted snow) has been greatest in the central part of the state, being four inches at Sedalia, diminishing to between one and two inches in the northwest.

To the southeast the fall diminishes slightly, rising to over three inches along the Mississippi from Saint Louis to Cairo.

The snow-fall was greatest in the northern and central-northern parts of the state, being twenty-two inches at Louisiana, eighteen inches at Kirksville, seventeen at Mexico, Houstonia and Chamois, sixteen at Miami, fourteen at Boonville, thirteen at Oregon and Sedalia, twelve at Glasgow and Lexington, eleven at Harrisonville, ten at Saint Louis, nine at Carthage, eight at Ironton and Centreville, five at Greenfield, and four at Pleasant Hill. At the end of the month, snow covered the entire state, except perhaps in the extreme south where the returns are meagre. At Kirksville, Chamois and Miami, the snow was eight inches deep at the end of the month, Louisiana, seven; Glasgow, Houstonia, and Oregon, five; Boonville, three; Harrisonville, Carthage, Lexington and Ironton, two, and at Mexico, one.

Lexington reports that "wheat has been well protected by the snow. Peach buds in this locality uninjured, 15° below zero appearing to be about the danger-line for peach, apricot and cherry." Oregon reports "peaches thought to be nearly all killed. Wheat in good condition under the snow. Hog disease which prevailed during November, December, and the beginning of January, is subsiding." Chamois reports the mean temperature to be $7^{\circ}.44$ below the normal for the last twelve years, and an excess of precipitation of 1.79 inches above the average of the last six years.

At Houstonia on the 21st, from 9 to 10 a. m., a solar halo of 22° radius with parhelia, and traces of the upper contact arch, together with the upper contact arch to the halo of 46° radius were observed. Centreville reports that although the minimum temperature of the air during the past January was 12° above that of 1884, the minimum temperature of the soil three inches below the surface was 4° colder during the last month, than during January, 1884.

The following is an extract from the January, 1885, report of the "Nebraska Weather Service," under direction of Prof. Goodwin D. Swezey, of Doane College, Crete:

The opening day of the month and year was a remarkable one in many respects. It opened with a cold wave which gave the lowest temperature of the season; the barometer indicated the highest pressure of the month, and at the central station the highest since the observatory was built; at this station also there was not a cloud in the sky nor scarcely a perceptible movement of the air, so that the total movement of the wind for the twenty-four hours was but five miles, which is well nigh unexampled for this region.

The unusual cold weather of last month has continued, the mean temperature for this month being lower than the normal by about 9° , and being several degrees lower than any past January for seven years, except in 1883. The precipitation has been a little below the normal, and the number of cloudy, clear, and stormy days about as usual.

The average of rain and melted snow, chiefly the latter, for the different sections of the state for January, 1885, is as follows: ne. section, 0.52 inch; se. section, 0.81; nw. section, 0.31; sw. section, 0.65. Greatest number of days of appreciable precipitation, 9 at Omaha and Dawson; least, 1 at Keene.

The following extract is taken from the January, 1885, report of the New England Meteorological Society, under direction of Professor Winslow Upton:

SUMMARY FOR JANUARY, 1885.

The following discussion of the meteorological conditions of the month is based upon reports from eighty observers, and upon the current publications of the United States Signal Service:

General Conditions.—The month has been characterized by excessive rain and snow, and by marked fluctuations of temperature. The most notable peculiarity was the complete change in the conditions near the middle of the month, by which it was divided into two periods having essentially different characteristics. The first half of the month was much warmer than the average, and the precipitation in the form of rain; the latter half was much colder than the average, and the precipitation largely in the form of snow. At the beginning of the month there was no frost in the ground in the southern portion, and but little in the northern; at the middle of the month the frost had again nearly disappeared, but at its close the ground was everywhere frozen and generally covered with abundant snow, while the ponds and rivers were coated with heavy ice.

Precipitation.—The amount of precipitation was, with few exceptions,

above the average, the excess having been about thirty-four per cent. There were five well-marked periods of precipitation, centering about the 7th, 12th, 17th, 25th, and 28th, and coincident with the movements of barometric depressions. In the first and second the form was rain; in the third and fourth, combined rain and snow; and in the fifth, almost wholly snow. The greater amount of the monthly precipitation was recorded in the first three.

Temperature.—The average temperature was nearly normal, but this does not exhibit the real character of the month. In addition to the marked difference between the earlier and latter days mentioned above, the daily changes were unusually severe. While the extremes reached were exceeded in the preceding month, the average ranges were large. Flowers were picked and some plowing done in the first decade. The temperature was generally below the normal after the 18th, the lowest temperatures of the month occurring near the 23d and 29th. At Mount Washington the minimum temperature, -50° , was the lowest ever observed at that station.

Pressure.—As in the case of temperature, the daily fluctuations in barometric pressure were unusually great. Five severe depressions passed in the vicinity of New England, moving from the southwest and attended by heavy rain or snow. The dates of passage have been already given. Four of these were of the normal type of winter cyclonic movements, but the remaining one, the third in order of occurrence, was of a special type. On the 15th and 16th a long and narrow barometric depression, but little below the normal, prevailed from the Gulf to Lake Erie; from this on the latter date, a depression with steep gradients formed with great rapidity and moved rapidly towards the Saint Lawrence and thence into the ocean, attended by violent gales. The pressure fell 0.7 inch in eight hours at Portland. The pressure was also unusually high in the areas of high pressure which passed over New England.

Wind.—Severe gales attended each of the barometric depressions and also the areas of high pressure which followed them. At Eastport, a velocity of 52 miles an hour was recorded on the 28th. At the summit of Mount Washington, velocities of over 100 miles an hour were experienced on eight days. On the 22d the daily movement was 2,140 miles, the largest ever recorded at the station, while the total movement of the month was 36,515 miles. It is estimated that the actual movement was 2,000 miles greater, as the formation of frost work interfered with the free working of the anemometer.

Miscellaneous.—Auroras were generally noted on the 8th, and at a few stations on the 17th.

Thunder and lightning are reported from Taunton and Cotuit in the early morning of the 28th, during the storm then occurring.

Solar halos were noted on several occasions, that on the 30th with accompanying parhelia having attracted much attention.

During the whole month the sun has been surrounded by a pinkish-white haze, as noted in previous months.

The following is an extract from the January, 1885, report of the "Ohio Meteorological Bureau," under direction of Prof. T. C. Mendenhall:

The mean atmospheric pressure for the month was somewhat lower than that of January, 1883, and 1884. There were two periods in the month of high barometer, the 3d and 22d, and there were also two periods of depression, the 6th and 11th. The minimum, 29.120 inches, being the lowest yet reported to the bureau. Mr. Stokey, the observer at Canton, reports the change in twenty-three hours, from 10 p. m., January 16th, to 9 p. m., January 17th, to be 1.242 inches. The range of barometer, 1.664 inches, is greater than that for the entire year 1883, and is but two hundredths less than the entire range of 1884. As indicated above in Mr. Stokey's report, the rise and fall were very sudden on one or two days.

The mean temperature, $22^{\circ}.6$, is $1^{\circ}.5$ below what may be considered as the normal. Although below the normal it is $3^{\circ}.2$ above the mean for January, 1884. The maximum, $76^{\circ}.0$, which occurred on the 9th, is $15^{\circ}.0$ above the maximum for January, 1883, and $16^{\circ}.3$ above that of January, 1884. The minimum, $-31^{\circ}.0$, is 3° below that of January, 1884. The northern and southern portions of the state had their lowest temperature on the 22d, while the central and north central parts report the lowest on the 29th. While the mean for the whole state is nearly up to the normal, in some parts of the state, and especially in the northwestern, the mean was much below the normal.

State summary.

Mean barometer, 30.162 inches; highest barometer, 30.784 inches on the 2d at Wauseon; lowest barometer, 29.120 inches on the 6th at Hiram; range of barometer, 1.664 inches; mean relative humidity, 82.0 per cent.; mean temperature, $22^{\circ}.6$; highest temperature, $76^{\circ}.0$ on the 9th at Ironton; lowest temperature, $-31^{\circ}.0$ on the 29th at Junction; range of temperature, $107^{\circ}.0$; greatest daily range of temperature, $58^{\circ}.5$ on the 30th at Sidney; least daily range of temperature, $1^{\circ}.2$ on the 7th at Hiram.

Average number of clear days, 8; fair days, 11; cloudy days, 12; days on which rain fell, 13.9. Greatest number of days on which rain fell, 19 at Cincinnati and Canton; least number of days on which rain fell, 6 at Levering.

Mean rainfall, 4.16 inches; average daily rainfall, .134 inch; greatest rainfall, 6.73 inches at Pomeroy; least rainfall, 1.42 inches at Oberlin.

Pervailing direction of wind, southwest.

The following extract is from the January, 1885, report of

the "Tennessee Weather Service," under the direction of Hon. A. J. McWhirter:

The month of January was characterized by the abnormally low temperature, the excess of rainfall, and the high winds and electrical disturbances.

The mean temperature for the month was $33^{\circ}.58$, $5^{\circ}.56$ below the December mean, and $4^{\circ}.13$ above the January mean of last year, which was considerably below the normal. The mean of maximum temperature was $62^{\circ}.23$, about the same as the January mean of last year, and the mean of minimum temperatures was $3^{\circ}.26$, nearly 5° below that for the corresponding period of last year. The range of temperature was 16° less than last January. The highest temperature was general about the 8-11th, and the lowest on the 22d, throughout the state.

The mean depth of rainfall was 6.96 inches, a slight excess over that for January of last year. It was pretty evenly distributed throughout the state, with the preponderance in the central and western portions of the eastern division. Only two stations report less than four inches. Melted snow forms a very small proportion of the amount. The days of the greatest rainfall were the 5th, 6th, 11th, 14th, 15th, 16th, 23d, 24th and 31st, corresponding almost throughout the list with those of December. These rains were general. There were only two rainless days during the month, the 2d, and 18th.

The snowfall during the month was light, 0.42 inch. The heaviest fall was in the northern portion of the western division, and in the southwestern portion of the eastern division. The fall in the middle division was very slight. The greatest depth reported was 2.10 inches at Farmingdale, and 2.00 inches at McKenzie and Dyersburg.

Thunder-storms were reported as follows: Greenville, 17th; Quarter, 11th; Maryville, 6th, 9 p. m., discharges of thunder, short and sharp, with vivid flashes of lightning; 11th, 9 p. m., followed by heavy rain; Andersonville, 11th, 6 a. m., with rain; Sunbright, 11th; Grief, 11th, p. m., with vivid lightning; Farmingdale, 12th, 1 a. m.; Fostoria, 11th, 26th, sw.; Cookeville, 11th, 15th; McMinnville, 11th; Manchester, 11th, with heavy rain, 27th; Beech Grove, 11th, sw.; Riddleton, 11th, 15th; Austin, 12th, 3 a. m., 15th; Flat Creek, 11th, 27th; Florence Station, 11th, 15th; Howell, 11th, p. m., 27th, p. m.; Nashville, 11th, 12th, 15th, 16th; Hardison's Mills, 11th, with heavy rain; Hurricane Switch, 11th; Kingston Springs, 11th, 15th; Dickson, 6th, 11th, 15th; Hohenwald, 27th, 8 p. m., se.; McKenzie, 11th, 17th; Dresden, 11th; Trenton, 5th, 11th.

Flood signals.—The system adopted by the government for the establishment of stations along the principal rivers to note the rise and fall and to give timely warning of approaching floods, is eminently a wise one, and will certainly prove a great blessing to those whose property is exposed to these sudden rises. Its benefits have already been felt to the people of our state along the Tennessee and its confluent. Stations are being established along the Cumberland, and in future we hope to be able to give from time to time tables of the stages of these rivers, which, no doubt, will prove very interesting and valuable additions to our reports.

State summary.

Mean temperature, $33^{\circ}.58$; highest temperature, 69° on the 16th at Grief; lowest temperature, -3° on the 22d at Dyersburg; range of temperature, 74° ; mean monthly range of temperature, $58^{\circ}.77$; greatest monthly range of temperature, 69° at Riddleton and Hohenwald; least monthly range of temperature, 48° at Barren Plains; mean daily range of temperature, 13° ; greatest daily range of temperature, 43° on the 16th at Nashville; least daily

range of temperature, 1° on the 6th at Bolivar and on the 24th at McKenzie and Trenton; mean of maximum temperatures, $62^{\circ}.23$; mean of minimum temperatures, $3^{\circ}.26$.

Mean depth of rainfall, 6.96 inches; mean daily rainfall, 0.224 inch; greatest rainfall, 10.08 inches at Careyville; least rainfall, 3.30 inches at Greenville; greatest local daily rainfall, 4.70 inches on the 14th at Fostoria.

Days of greatest rainfall, 5th, 6th, 11th, 14th, 15th, 16th, 23d, and 24th; day of greatest rainfall during month, 15th; average number of days on which rain or snow fell, 10.8; average number of clear days, 7; average number of fair days, 8; average number of cloudy days, 16; average snowfall during month, 0.42 inch.

Prevailing direction of wind, north and northwest.

OBSERVATIONS AT NEW WESTMINSTER, B. C.—(N. $49^{\circ} 13'$, W. $122^{\circ} 53'$).

	January.	February.	March.	April.	May.	June.
1884.						
TEMPERATURE.	°	°	°	°	°	°
Mean temperature.....	33.90	29.90	42.00	50.30	55.30	60.40
Above or below mean of ten years.....	-0.40	-7.40	+2.30	+2.40	+1.10	+2.40
Highest maximum.....	48.00	56.00	59.00	73.00	82.00	82.00
Lowest minimum.....	23.00	8.00	21.00	35.00	38.00	45.00
PRECIPITATION.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
Rain and snow.....	8.02	3.70	1.63	2.11	3.05	3.28
Above or below mean of ten years.....	-0.14	-3.90	-4.64	-0.81	-0.44	+0.96
Number of days rain or snow fell.....	12	10	5	9	7	13
Above or below mean of ten years.....	-2	-6	-14	-3	-7	+1
Greatest day's fall.....	1.47	0.91	0.75	0.48	0.84	0.88
Snowfall.....	1.50	12.80	0.00	0.03	—	—
Above or below mean of ten years.....	-16.30	+3.75	-14.10	-0.80	—	—

	July.	August.	September.	October.	November.	December.
1884.						
TEMPERATURE.	°	°	°	°	°	°
Mean temperature.....	61.80	65.70	54.30	48.20	44.70	35.30
Above or below mean of ten years.....	-1.50	+4.50	-3.00	-0.80	+4.80	-9.50
Highest maximum.....	81.00	90.00	68.00	61.00	55.00	48.00
Lowest minimum.....	49.00	50.00	40.00	34.00	27.00	-2.00
PRECIPITATION.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
Rain and snow.....	0.77	7.01	5.93	8.77	3.56	1.01
Above or below mean of ten years.....	-1.01	+5.05	+2.49	+3.07	-3.39	-5.47
Number of days rain or snow fell.....	8	8	15	16	12	12
Above or below mean of ten years.....	-	-	+4	-	-	-3
Greatest day's fall.....	0.27	2.52	0.87	1.68	0.90	4.10
Snowfall.....	—	—	—	—	0.00	9.00
Above or below mean of ten years.....	—	—	—	—	-5.70	+5.00

Yearly mean temperature, $47^{\circ}.7$; below mean, $0^{\circ}.2$; highest temperature, $90^{\circ}.0$; lowest temperature, $-2^{\circ}.0$, lowest since 1875. Rainfall in inches, 51.84; below mean, 7.72. Days of rain or snowfall, 124; below mean, 27. Snow in inches, 23.3; below mean, 28 inches.

A. PEELE, Captain,
Canada Meteorological Service.

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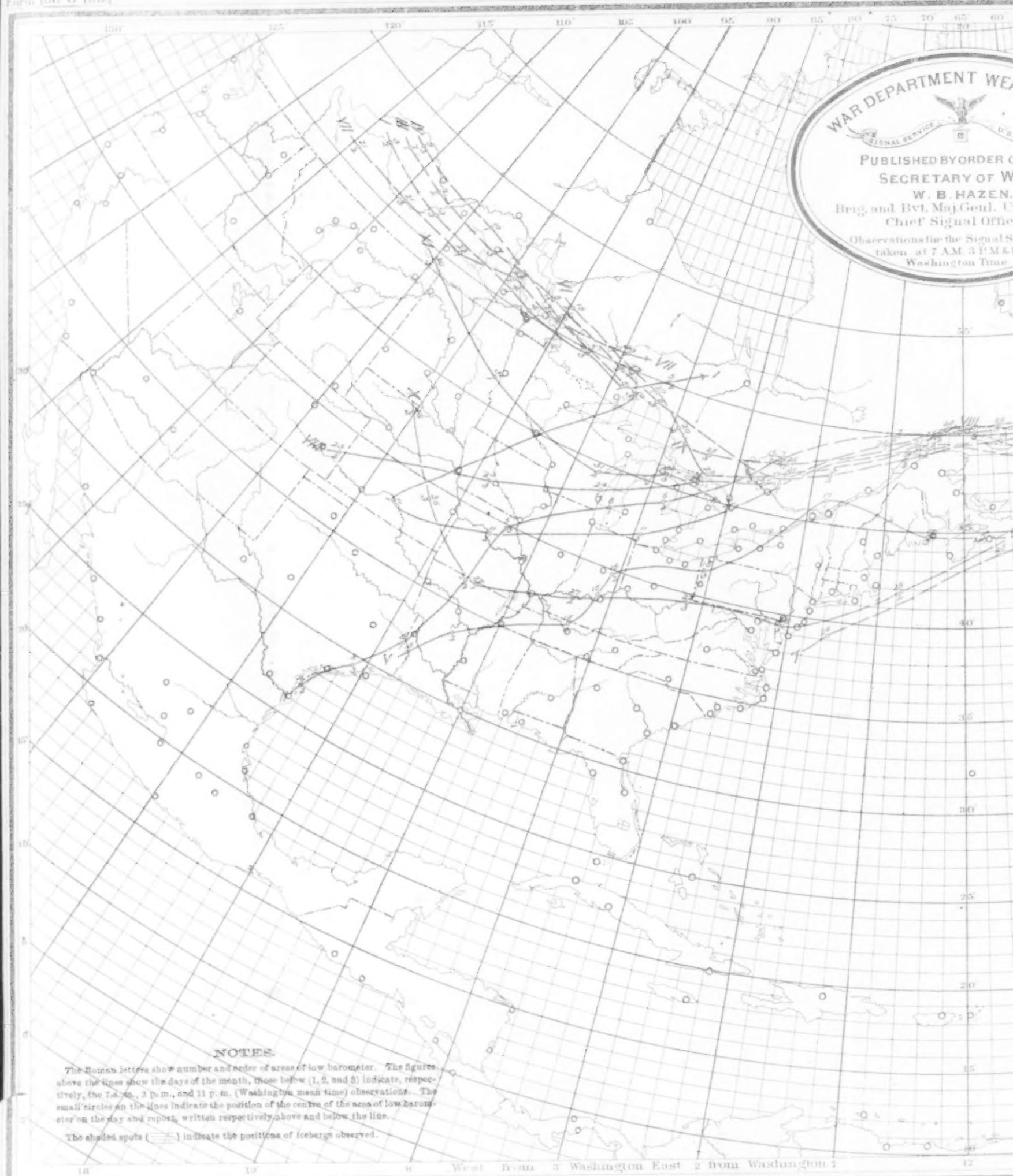
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Chart I. Tracks of Low-Barometer

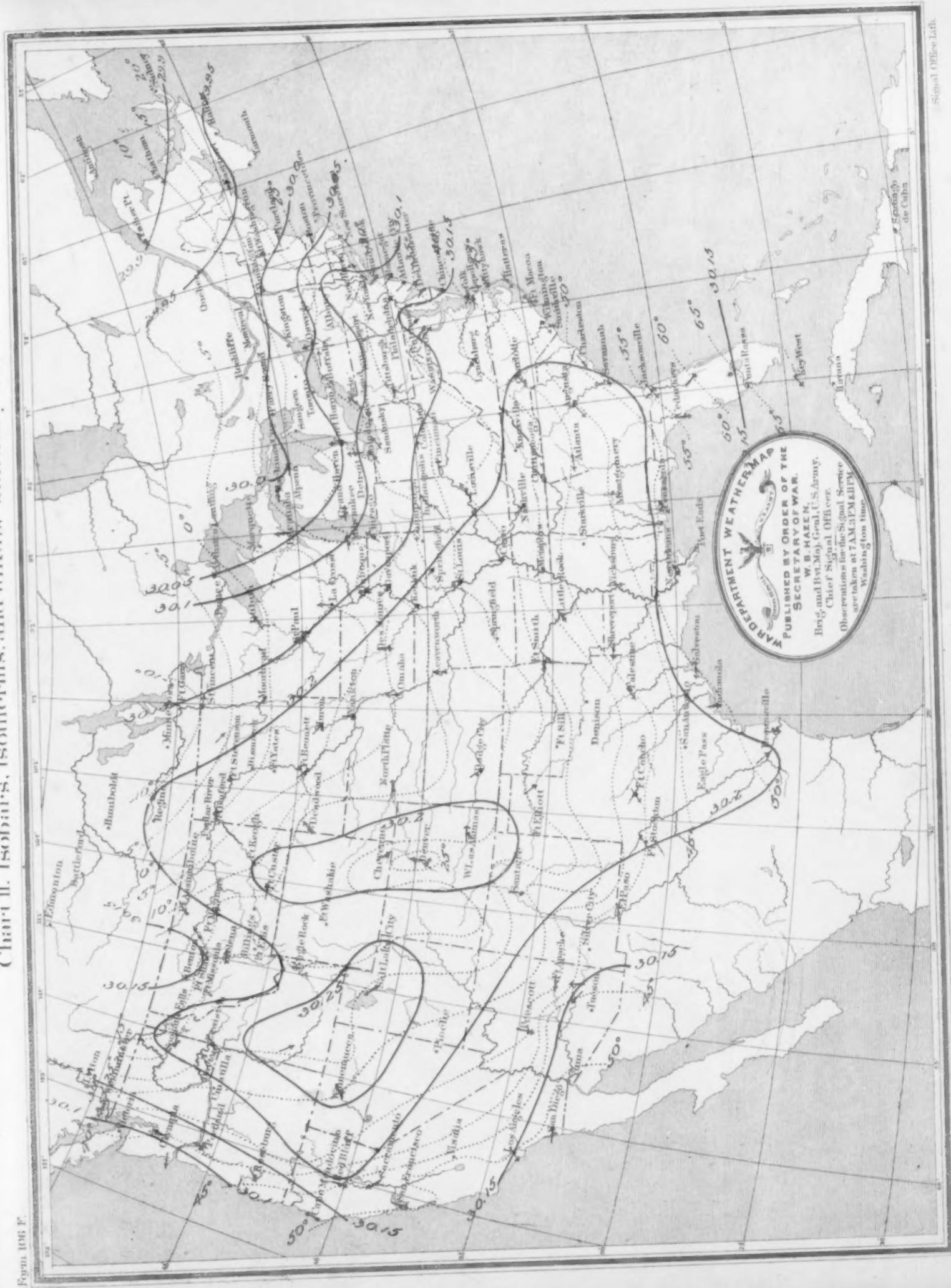
Form 196 G 1884



meter Areas, January 1885

(Chap. II) Solubility, Solubility, and Winds, January 1881.

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Chart III. Precipitation, January 1885.

Chart III. Precipitation, January 1885.

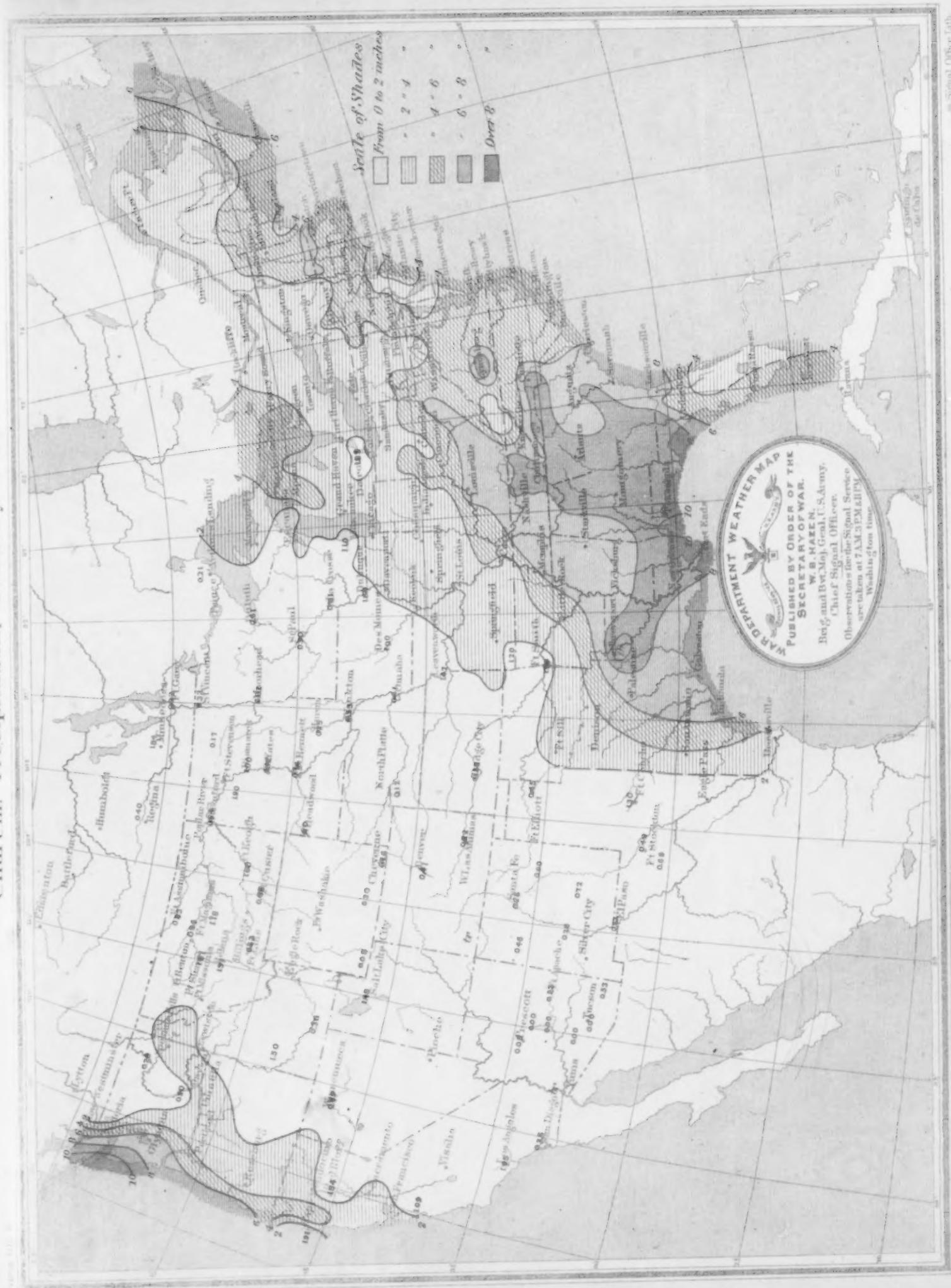
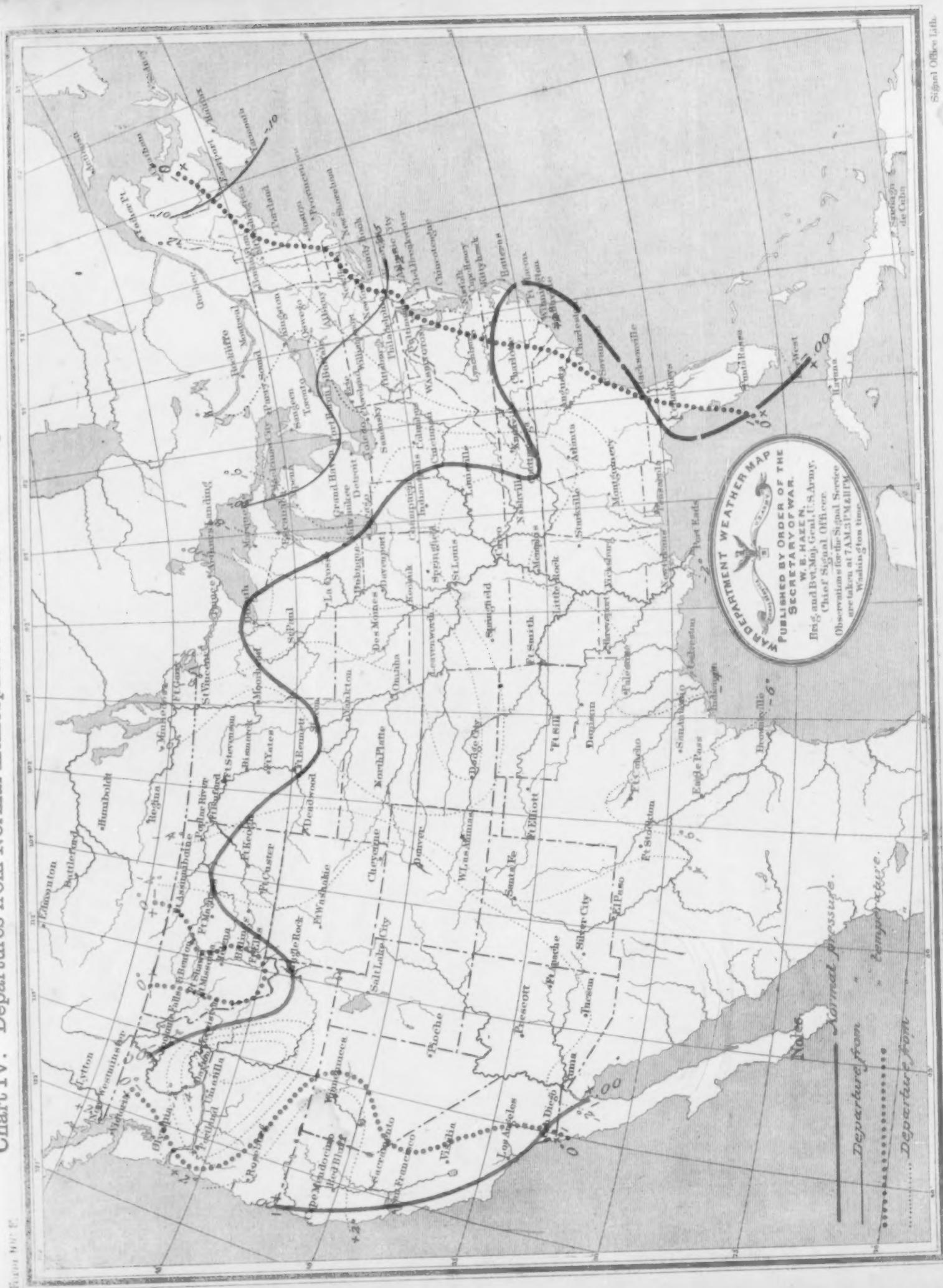
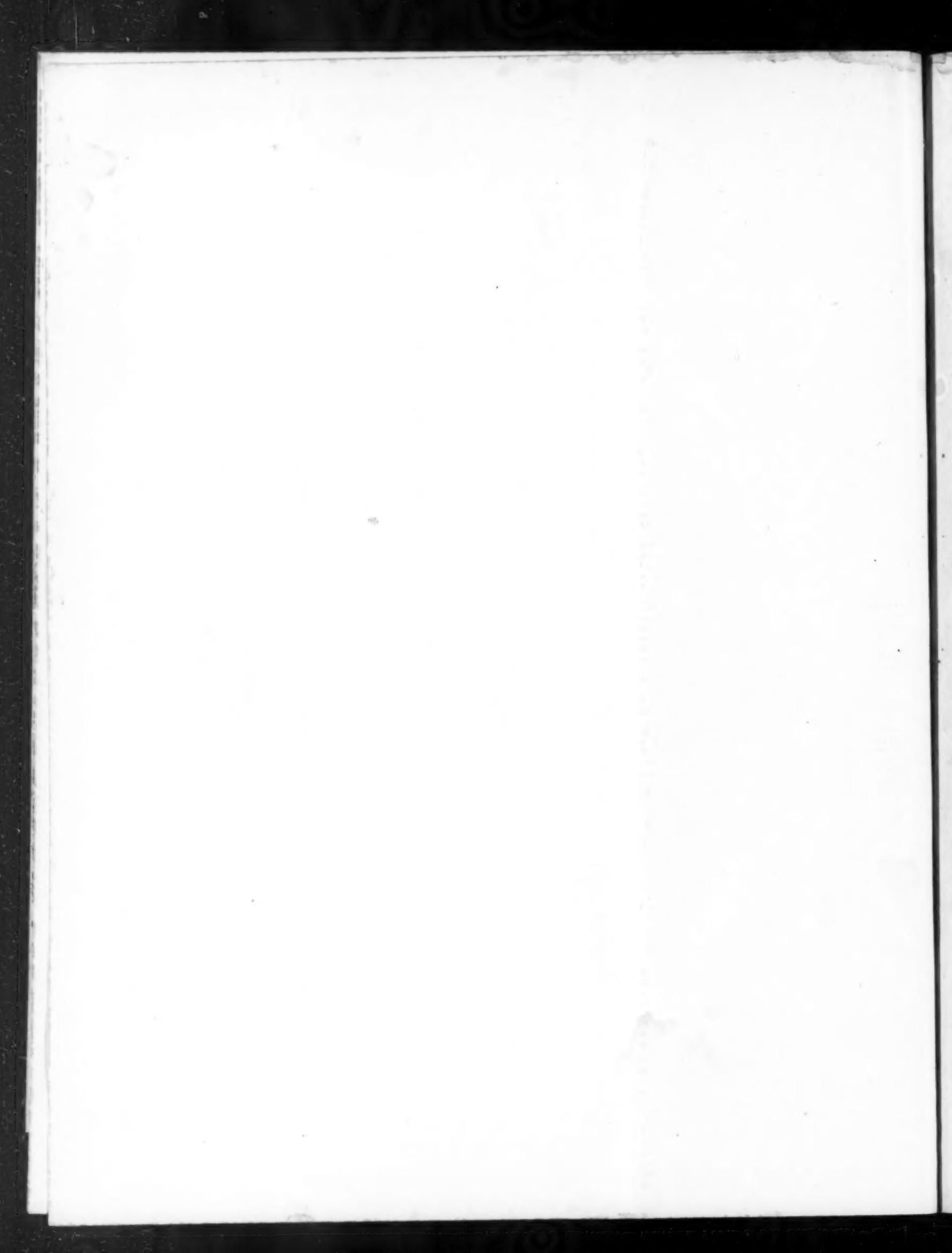


Chart IV. Departures from Normal Atmospheric Pressure and Temperature. January, 1885.

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Voluntary observers of the Signal Service, on land, from whom meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for January, 1885.

Observer and place of observation.

Anderson, Dr. W. W., Stateburg, S. C.
Altafier, J. M., Independence, Kans.
Adams, Dr. O. H., Vineland, N. J.
Andrews, L., Southington, Conn.
Abbott, Dr. E. K., Salina City, Cal.
Bennett, Geo., Bandon, Oreg.
Beloit College, Beloit, Wis.
Bell, Joseph, Franklin, Pa.
Bowen, F. W., Humboldt, Iowa.
Brainerd, Dr. H. G., Independence, Iowa.
Baker, Dr. Henry B., Lansing, Mich.
Beall, Dr. R. L., Lenoir, N. C.
Brendel, Fred., Peoria, Ill.
Bentley, David, Princeton, Cal.
Bowman, Peter, Ruggles, Ohio.
Boerner, Prof. Chas. G., Vevay, Ind.
Bartlett, E. B., Vermillion, N. Y.
Baldwin, A. L., Bethel, Conn.
Bardsley, Jas. G., Nephi, Utah.
Briggs, John, Albany, Oreg.
Boggs, W. R., Brevard, N. C.
Beans, Thos. J., Moorstown, N. J.
Betts, Prof. Arthur, Webster, Dak.
Breed, J. E., Embarras, Wis.
Buck, Mrs. R., Red Willow, Nebr.
Baker, Dr. L. J., Ottumwa, Iowa.
Boies, Lieut. A. H., Hudson, Mich.
Becker, Rev. W., Prairie du Chien, Wis.
Ballou, Dr. N. E., Sandwich, Ill.
Boyd, Joseph, Oskaloosa, Iowa.
Beebe, A., Manistique, Mich.
Beecher, Chas., Newport, Fla.
Bryant, A. F., Yutan, Nebr.
Blachly, C. P., Manhattan, Kans.
Charbonnier, Prof. L. H., Athens, Ga.
Cook, S. A., Milledgeville, Ga.
Cotton, Dr. D. B., Portsmouth, Ohio.
Clark, A. C., Wausau, Wis.
Casey, Geo., Auburn, N. Y.
Crawford, E. A., Liberty Hill, La.
Curtiss, G. G., Fairmont, Md.
Cornell University, Ithaca, N. Y.
Cutler, B. B., Heath, Mass.
Cooke, A. R., Indianola, Iowa.
Cutting, Hiram A., Lunenburg, Vt.
Crosier, Adam, Laconia, Ind.
Caulkins, John S., Thornville, Mich.
Clark, T. A., Weldon, N. C.
Crawford, D. F. G., Leetsdale, Pa.
Carleton College, Northfield, Minn.
Chandler, Dr. W. J., South Orange, N. J.
Cass, John J., Atchison, Kans.
Chase, Pliny E., Haverford College, Pa.
Carter, Rev. Dr. W. H., Tallahassee, Fla.
Comstock, Prof. F. M., Le Roy, N. Y.
Cochran, Wm. P., Clay Centre, Kans.
Calhoun, P. B., Austin, Tenn.
Carpenter, Dr. W. B., Leavenworth, K.
Christ, Jacob, Franklin, Wis.
Cheney, Wm., Minneapolis, Minn.
Cox, Prof. T. E., Elkinsburg, Md.
Coffey, Wm. K., Carthage, Mo.
Collin, Prof. Alonso, Mt. Vernon, Iowa.
Cooper, Dr. Geo. C., Manatee, Fla.
Couch, E. D., Ontonook, S. H.
Chapin, Miss M. A., Highlands, N. C.
Chapin, Adams, Poway, Cal.
Cleveland, Dr. G. H., Morestown, Mich.
Cowgill, Miss S. P., Sterling, Kans.
Culver, G. E., Vermillion, Dak.
Clayton, H. H., Ann Arbor, Mich.
Cole, Seward, Cabuenga, Cal.
Corbin, F. E., Dudley, Mass.
Chubb, Thos. H., Post Mills, Vt.
Capen, F. S., Waterville, Me.
Davis, Jacob, Howe, Mass.

Observer and place of observation.

Dickinson, Jas. R., Guttenberg, Iowa.
Dechant, Wm., Tamaqua, Pa.
Deming, H. D., Wellsboro, Pa.
Dozier, Wm., Mattoon, Ill.
Dewhurst, Rev. E., Voluntown, Conn.
Day, Theodore, Dyberry, Pa.
Dawson, Wm., Spiceland, Ind.
Dunton, Lieut. W. R., Dorset, Vt.
Dunlap, W. L., Tecumseh, Nebr.
Dow, Roswell, Sycamore, Ill.
Dudley, C. B., Altoona, Pa.
Doten, Hosea, Woodstock, Vt.
Douglas, Dr. B. H., Asheville, N. C.
Davis, Prof. C. K., Fort Collins, Colo.
Ellason, W. A., Stateville, N. C.
Eckstein, Rev. M., Conception, Mo.
Ellis, John, Marquette, Nebr.
Ellsworth, W. W., Hartford, Conn.
Elliott, Rev. J. C., Swanwick, Ill.
Fernald, Prof. M. C., Orono, Me.
Fleming, John, Readington, N. J.
Ferris, B. F., Sunman, Ind.
Fouch, Dr. A., College City, Cal.
Foss, E. T., Hydesville, Cal.
Fox, F. E., Fall Brook, Cal.
Ferguson, W., Paterson, N. J.
Fuller, E. N., Tacoma, Wash. T.
Frick, Prof. J. H., Warrenton, Mo.
Gates, W. B., Burlington, Vt.
Gillingham, W., Acetink, Va.
Gratwohl, John, Blooming Grove, Pa.
Gillingham, Milnor, Fallsington, Pa.
Gardiner, R. H., Gardiner, Me.
Gowey, H. D., North Lewisburg, Ohio.
Gibson, John H., Salina, Kans.
Green, Dr. Jesse C., West Chester, Pa.
Gerrish, S. H., Sacramento, Cal.
Gray, J. W., Stockham, Nebr.
Goodwin, Wm., North Colebrook, Conn.
Geddings, Dr. W. H., Aiken, S. C.
Gregory, J. W., *Sherlock, Kans.
Gray, Capt. A. W., Kenwick, Wash. T.
Gordon, Dr. G. G., Swartz Creek, Mich.
Heath, E. R., Wyandotte, Kans.
Horn, Dr. H. B., Atchison, Kans.
Hiram College, Hiram, Ohio.
Harvard College Observatory, Cambridge, Mass.
Hammitt, John W., College Hill, Ohio.
Henton, Isaac E., Fremont, Nebr.
Helm, Thos. B., Logansport, Ind.
Hoskinson, R. M., Bainbridge Island, Wash. Ter.
Hunter, Dr. T. C., Wabash, Ind.
Haywood, John, Westerville, Ohio.
Hyde, G. A., Cleveland, Ohio.
Hassler, B. K., Chambersburg, Pa.
Hartzler, J. A., Mottville, Mich.
Hall, J. B., Worcester, Mass.
Hazen, L. G., Terre Haute, Ind.
Howe, Prof. J. L., Richmond, Ky.
Hoyt, F. C., Easton, Pa.
Houghton Farm Experiment Station, Mountaintown, N. Y.
Heatwole, L. J., Dale Enterprise, Va.
Hurley, J. M., Lancaster, Wis.
Harris, Thos. C., Raleigh, N. C.
Heacock, J. L., Quakertown, Pa.
Hazen, Rev. A., Deerfield, Mass.
Harris, W. C., Dover, N. J.
Hickman, E. A., Independence, Mo.
Hasenstab, P. J., Kendall Green, D. C.
Housekeeper, H. S., S. Bethlehem, Pa.
James, John W., Marengo, Ill.
Jones, Dr. E. U., Taunton, Mass.

Observer and place of observation.

Jordan, Dr. M. D. L., Milan, Tenn.
Jones, Ira B., Neillsville, Wis.
Jones, F. M., Puerto de Luna, N. Mex.
Knapp, J. G., Limona, Fla.
Keesee, G. Pomeroy, Cooperstown, N. Y.
Kuhne, F. W., Fort Wayne, Ind.
Keeler, W. F., Mayport, Fla.
Kirkwood, E., Mauzy, Ind.
Kent, Miss E., Phillipsburg, N. J.
Kaufman, H. W., Dillingersville, Pa.
Lueps, Miss Johanna, Manitowoc, Wis.
Lincoln, A. T., Marion, Va.
Loomis, J. C., Jeffersonville, Ind.
Lay, Dr. F. H., Pueblo, Colo.
Lucas, Dr. G. L., Albion, Idaho.
Luther, S. M., Garrettsville, Ohio.
Ladshaw, Geo. E., Pacolet, S. C.
Lovewell, Prof. J. T., Topeka, Kans.
McDonough Institute, McDonough, Md.
McCready, Miss L. A., Fort Madison, Iowa.
Moore, C. R., Johnsontown, Va.
Munn, A. M., Kalamazoo, Mich.
Metcalfe, Dr. John G., Mendon, Mass.
Micklem, J. Howard, Variety Mills, Va.
Meehan, Thos., Germantown, Pa.
Moore, Nathan, Grampian Hills, Pa.
Mikesell, Thos., Wauseon, Ohio.
McPherson, Wm., San Rafael, Cal.
McClintock, F., West Union, Iowa.
Marshall, G., Cresco, Iowa.
Mitchell, Dr. D. W., Harrisville, Mich.
Neen, Dr. J. C., Archer, Fla.
Newbegin, John D., Anna, Ill.
Nelson, P. P., Northport, Mich.
Neill, Thos., Sandusky, Oh.
Newcomb, G. S., Westborough, Mass.
Nourse, H. D., Washington, D. C.
Noll, A. B., Somerville, N. J.
Nordberg, A., Richardson, Dak.
Osborn, Dr. Thos. C., Cleburne, Tex.
Osmond, Prof. I. T., State College, Pa.
Olds, H. D., Cedar Rapids, Iowa.
Owsley, Dr. J. B., Jacksonborough, O.
Pearce, Thomas, Eola, Oreg.
Parmelee, Francis D., Hillsdale, Mich.
Pierson, Rev. J., Ionia, Mich.
Powrie, W., Sussex, Wis.
Parrish, Geo. W., Ellensburg, Wash. T.
Patterson, Wm., Salem, N. J.
Patrick, J. M., North Volney, N. Y.
Purdue University, La Fayette, Ind.
Prosser, Chas. S., Ithaca, N. Y.
Pettersen, Dr. F., Comfort, Tex.
Remington, C. V. S., Fall River, Mass.
Robertson, T. D., Rockford, Ill.
Rogers, F. M., Luling, La.
Renfrew, H. N., Wilton Center, Ill.
Rodman, Thos. R., New Bedford, Mass.
Rockwood, Prof. C. G., Princeton, N. J.
Reric, R. H., La Grange, Ind.
Shaw, J., Chester, Minn.
Shriver, E. T., Cumberland, Md.
Seltz, Chas., De Soto, Nebr.
Scott, Thos. G., Forsyth, Ga.
Stucky, Dr. C. T., Helvetia, W. Va.
Stern, Jacob T., Logan, Iowa.
Slade, Ellis n., Somerset, Mass.
Slenker, Mrs. E. D., Snowville, Va.
Scribner, H. F. J., Strafford, Vt.
Shriver, Howard, Wytheville, Va.
Smith, H. D., Monticello, Iowa.
Shahan, Chas. C., Edgington, Ill.
Safford, A. T., Williamstown, Mass.
Sherman, W. B., Manchester, Iowa.

Observer and place of observation.

Smith, Rev. D. W., Troy, Pa.
Samostz, Oscar, Austin, Tex.
Spooner, Lieut. G. H., Blacksburg, Va.
Staudenmayer, Dr. L. R., Lincolnton, N. C.
Snell, Miss S. C., Amherst, Mass.
Sanderson, H. S., Clarksville, Tex.
Shaw, E., Maud, Kans.
Sim, John R., Summit, Va.
Sewell, T. M., New Athens, Ohio.
Sommerville, W. B., Birmingham, Ala.
Snow, Prof. F. H., Lawrence, Kans.
Shepard, E. M., Springfield, Mo.
Starr, Prof. F., Cedar Rapids, Iowa.
Sadler, Prof. H. E., Emporia, Kans.
Spelman, J. J., Pierce City, Mo.
Stone, W. E., Amherst, Mass.
Sargent, J. B., Leicester, Mass.
Trembley, Dr. J. B., Oakland, Cal.
Todd, Prof. David P., Amherst, Mass.
Teele, Rev. A. K., Milton, Mass.
Truman, Geo. S., Genoa, Nebr.
Turnbow, Silas C., Pro Tem, Mo.
Fillingham, C. B., Albany, N. Y.
Turner, Ernest, Point Pleasant, La.
Tyrell, A. C., Madison, Nebr.
Treimer, Geo., Round Grove, Iowa.
Thompson, R. J., Tiffin, Ohio.
Upton, Prof. W., Providence, R. I.
Van Inwegen, C. F., Port Jervis, N. Y.
Voegeli, Adolphus, Des Moines, Iowa.
Venable, Prof. F. P., Chapel Hill, N. C.
Vermillion, W. W., Curryville, Mo.
Washburne Observatory, Madison, Wis.
Wild, Rev. E. P., Newport, Vt.
Williams, Rev. C. F., Ashwood, Tenn.
Wing, Miss M. E., Charlotte, Vt.
West, Silas, Cornish, Me.
Went, E. C., Frankfort, Ky.
Wylie, Wm., Mount Forest, Canada.
Whittington, G., Mount Ida, Ark.
Walton, J. P., Muscatine, Iowa.
Wait, S. E., Traverse City, Mich.
Woodstock College, Woodstock, Md.
Wolfe, John H., Wellington, Kans.
West, Dr. J. O., Princeton, Mass.
Washington Receiving Reservoir, D. C.
Aqueduct Distributing "
Great Falls Reservoir, Md
Rock Creek Bridge, D. C.
Weir's Bridge, N. H.
Winipiseogee Wood-tock, N. H.
Lake Cottontail Wolfborough, N. H.
and Woolen Lake Village, N. H.
Manufacturing Co. Bristol, N. H.
Belmont, N. H.
Ashland, N. H.
Willis, O. R., A. M.: Ph. D., White Plains, N. Y.
Williams, Dr. A. C., Elk Falls, Kans.
Wigg, Dr. Geo., East Portland, Oreg.
Watters, Dr. Jas., Holton, Kans.
Woods, Mrs. Dr. A. G., Maynard, Iowa.
Wetmore, E. L., Tucson, Ariz.
Wright, J. W. A., Greensboro, Ala.
Watson, Dr. S. T., Nayatt Point, R. I.
Wadsworth, Dr. J. L. R., Collinsville, Ill.
Watson, Evan, Fort Scott, Kans.
Widman, Rev. C. M., Grand Coteau, La.
Wistrom, M. F., Harvard, Nebr.
Worth, J. M., Kelley's, N. C.
Winn, Rev. T. S., Green Springs, Ala.
Yetter, Wm. G., Catawissa, Pa.
Yates, T. P., Factoryville, N. Y.
Young, Geo. R., Penn Yan, N. Y.
Zimmerman, F. C., Bunker Hill, Ill.

Military posts from which meteorological reports were received, through the Surgeon General of the Army, in time to be used in the preparation of the Monthly Weather Review for January, 1885.

Alcatraz Island, Cal.
Angel Island, Cal.
Assinaboine, Fort, Mont.
A. Lincoln, Fort, Dak.
Benicia Barracks, Cal.
Bidwell, Fort, Cal.
Brady, Fort, Mich.
Bridger, Fort, Wyo.

Brown, Fort, Tex.
Burranchas, Fort, Fla.
Concho, Fort, Tex.
Columbus, Fort, N. Y.
David's Island, N. Y. H.
Ellis, Fort, Mont.
Fred Steele, Fort, Wyo.
Gaston, Fort, Cal.

Hamilton, Fort, N. Y.
Klamath, Fort, Oreg.
Keogh, Fort, Mont.
Lyon, Fort, Colo.
Lewis, Fort, Colo.
Mason, Fort, Cal.
McDermitt, Fort, Nev.

Monroe, Fort, Va.
McHenry, Fort, Md.
Mount Vernon B'ks, Ala.
McDowell, Fort, Ariz.
Niagara, Fort, N. Y. [Cal. Saint Augustine, Fla.
Presidio of San Francisco, Sully, Fort, Dak.
Plattsburg Barracks, N. Y. Sisseton, Fort, Dak.

Pembina, Fort, Dak.
Preble, Fort, Me.
Mount Vernon, Fort, Dak.
Snelling, Fort, Minn.
Presidio, Fort, Dak.
Plattsburg Barracks, N. Y. Sisseton, Fort, Dak.

Shaw, Fort, Mont.
Townsend, Fort, Wash. T.
Totten, Fort, Dak.
Union, Fort, N. Mex.
West Point, N. Y.
Wingate, Fort, N. Mex.
Yates, Fort, Dak.

State weather services from which meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for January, 1885.

Alabama State Weather Service, under direction of Prof. P. H. Mell, Jr., Auburn, Alabama.
Georgia State Weather Service, under direction of Hon. J. T. Henderson, Atlanta, Ga.
Missouri State Weather Service, under direction of Prof. Francis E. Nipher, Saint Louis, Mo.
Nebraska State Weather Service, under direction of Prof. Goodwin D. Swozey, Crete, Nebraska.
Indiana Volunteer Weather Service, under direction of Prof. W. H. Ragan, Greenfield, Indiana.
Indiana State Weather Service, under direction of Prof. H. A. Huston, La Fayette, Indiana.
Ohio State Weather Service, under direction of Prof. T. C. Mendenhall, Columbus, Ohio.
Tennessee State Weather Service, under direction of Hon. A. J. McWhirter, Nashville, Tennessee.
Minnesota State Weather Service, under direction of Prof. W. W. Payne, Northfield, Minnesota.
Illinois State Weather Service, under direction of Mr. S. D. Fisher, Springfield, Ill.
New England Meteorological Society: Prof. Winslow Upton, of Providence, director; Mr. W. M. Davis, of Cambridge, secretary.
Data have also been used from meteorological records of the Central Pacific and Southern Pacific railway companies.

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Reading down to 28 inches.....			\$30.00
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Barometer cistern, complete.....		4.25	do.
Light brass tripod for barometer.....		10.00	do.

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do. solar radiation.....	10.00	do.
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Anemometer, "Robinson's," (velocity).....	\$25.00
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Furnished by John McDermott & Bros., 210 Pennsylvania Avenue, Washington, D. C.

Wind vane, sun-east.....	\$ 8.00	Packing, \$.
do. large.....	65.00	do. 5.00
do. "Eccard's" attachment for use with anemograph.....	10.00	do. —
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Anemometer, telescopic rod for, new pattern.....	57.00	do. 3.00

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"Locomis" Meteorology.....	1.00
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Farmers' weather case.....	54.70
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Farmers' Bulletin, mailed from other printing stations daily, except Sundays, each, (postage .01).....	.01
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